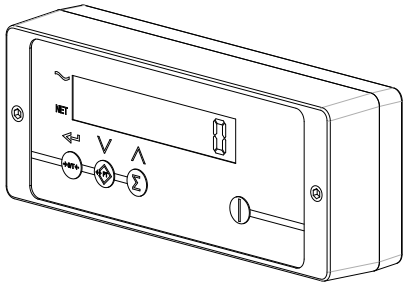
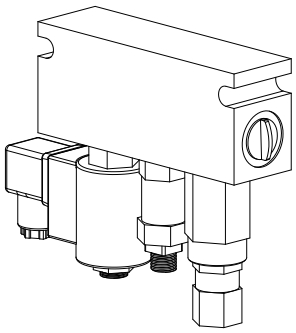
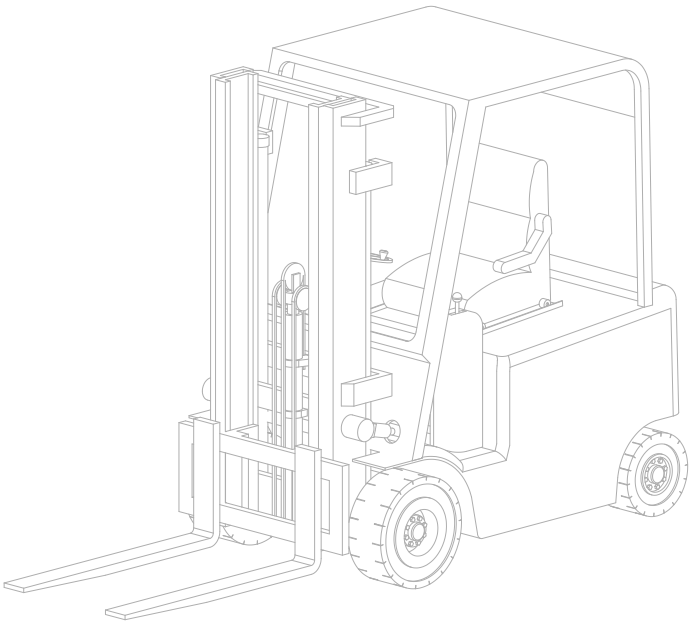
INSTALLATION MANUAL
RCS *PLUS*







PLEASE RETAIN THESE ASSEMBLY INSTRUCTIONS FOR FUTURE REFERENCE
If you have any queries concerning the duration and terms of the guarantee, please contact your supplier. We would also refer you to our General Sale and Supply Conditions, which are available on request.

The manufacturer accepts no liability for any damage or injury caused by failure to follow these instructions, or from negligent operation or assembly, even if this is not expressly stated in this instruction manual.
In light of our policy of continuous improvement, it is possible that details of the product may differ from those described in this manual. For this reason, these instructions should only be treated as guidelines for the installation of the relevant product. This manual has been compiled with all due care, but the manufacturer cannot be held responsible for any errors or the consequences thereof. All rights are reserved and no part of this manual may be reproduced in any way.

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1. Introduction

This manual describes the assembly of the RCS *PLUS*. Read this manual carefully. The installer must be informed of the contents of this manual. Follow the contents of the manual precisely. Always do things in the correct order. This manual should be kept in a dry and safe place.
In case of damage or loss the user may request a new copy of the manual from RAVAS.

2. Warnings & safety measures

READ CAREFULLY

When installing the RCS *PLUS*, please observe carefully the instructions and guidelines contained in this manual. Always perform each step in sequence. If any of the instructions are not clear, please contact RAVAS.

ATTENTION

The installation of the RCS *PLUS* should only be performed by an acknowledged electro and hydraulic technical installer.
Possible failures to the equipment must be communicated to your installer.
The equipment should be checked annually by your installer.

Should you have any further questions after reading this manual please contact us at:

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3. Overview of components

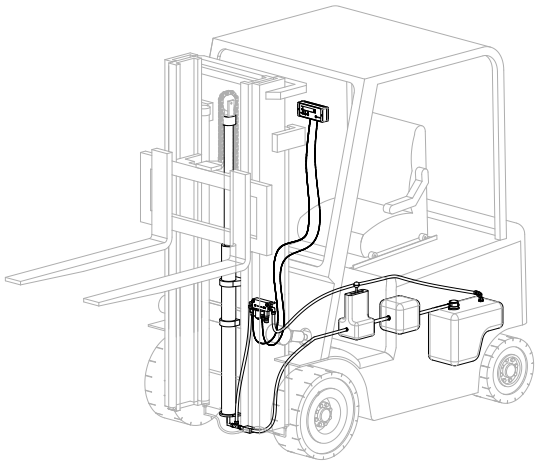
The RCS *PLUS* weighing system consists of two main components:

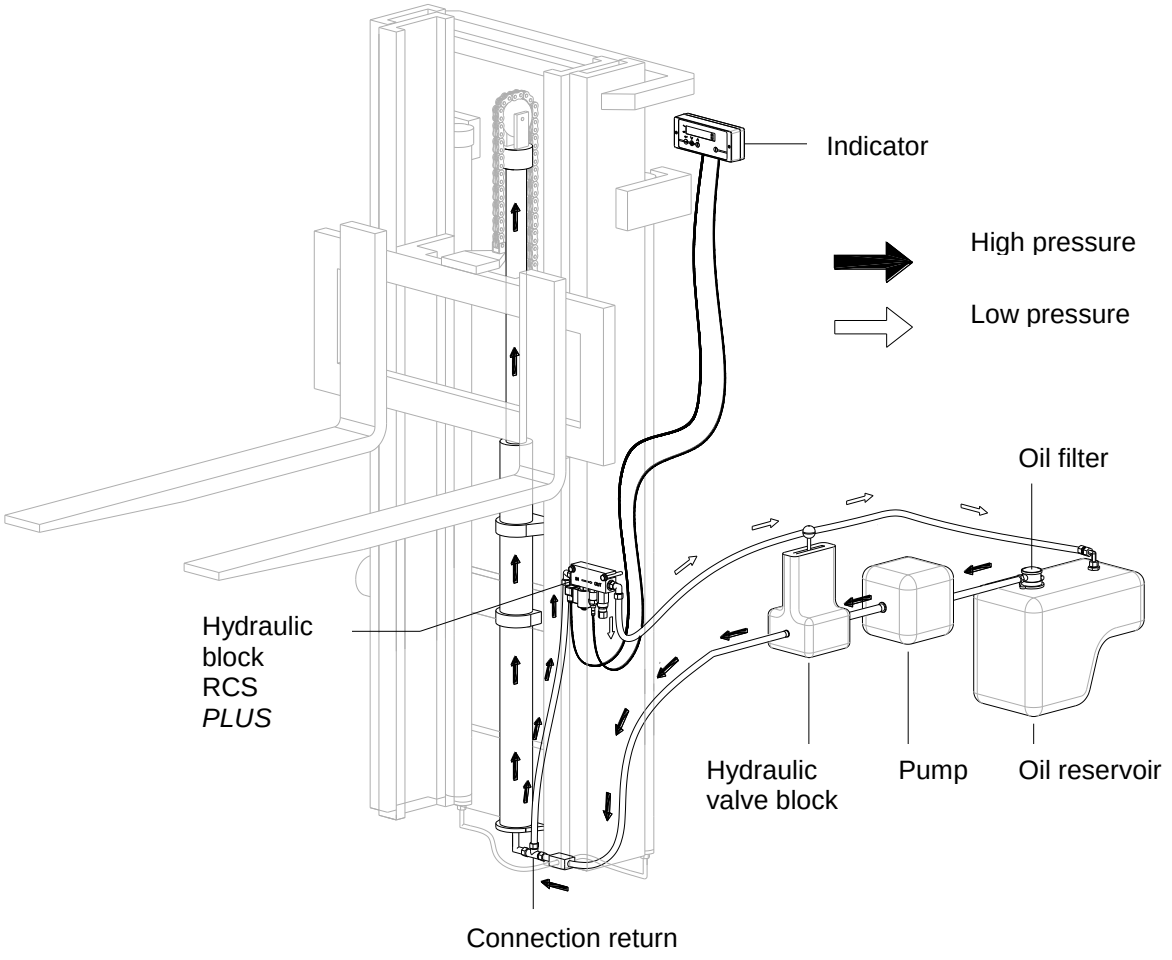
1. Indicator
2. Hydraulic block

The hydraulic block has been connected on the hydraulic system of the forklift truck. The indicator, the control panel of the system for the driver, operates on 12 Volt DC supply connected on the battery of the truck. The illustation below shows the components in the circuit.

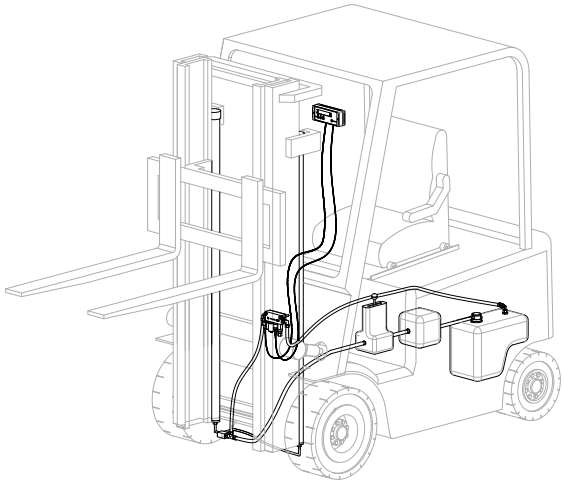
It is advised that the installation of the hydraulic block in the hydraulic system of the forklift truck is carried out by your official forklift dealer.

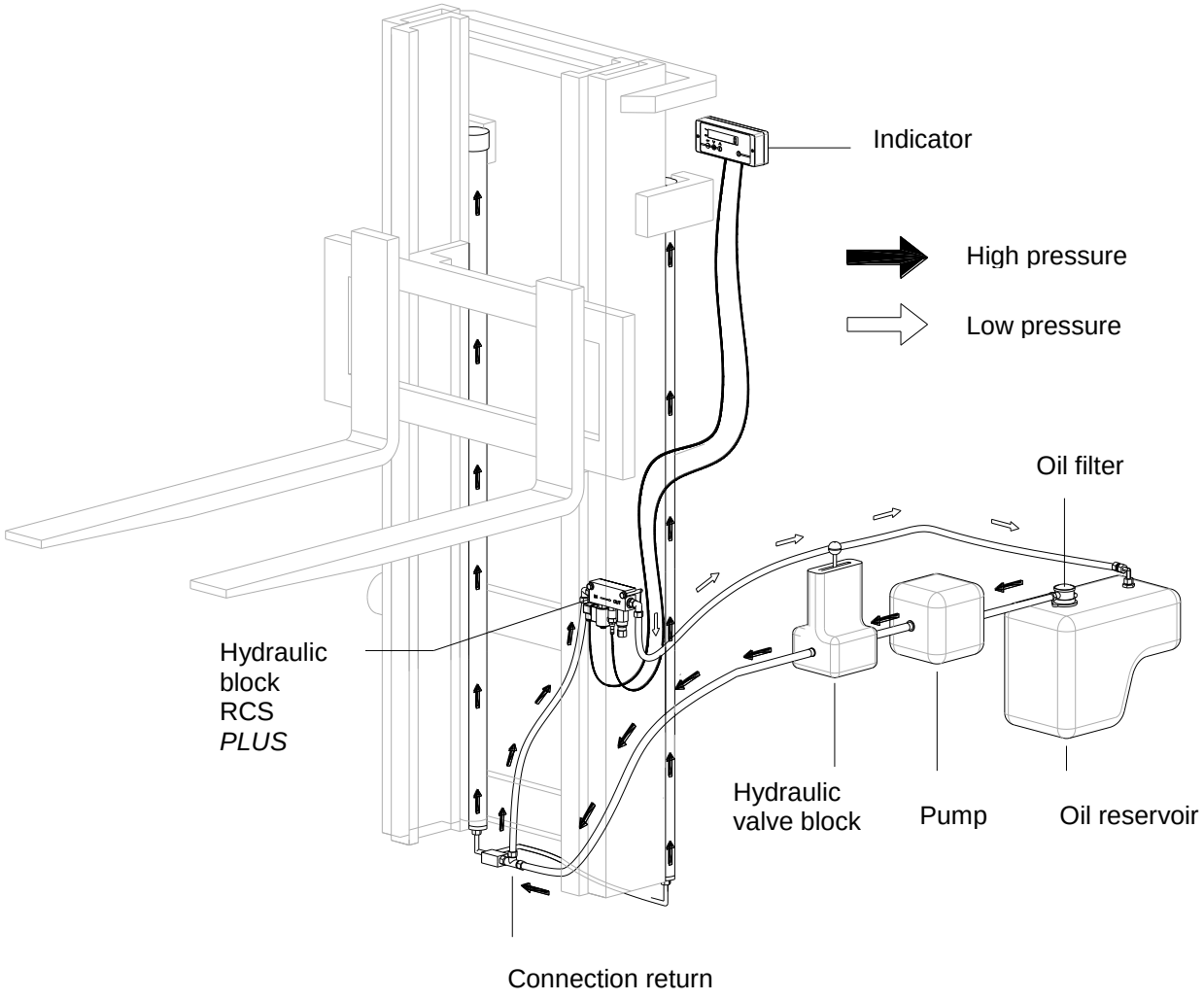
Type A: 1 center cylinder



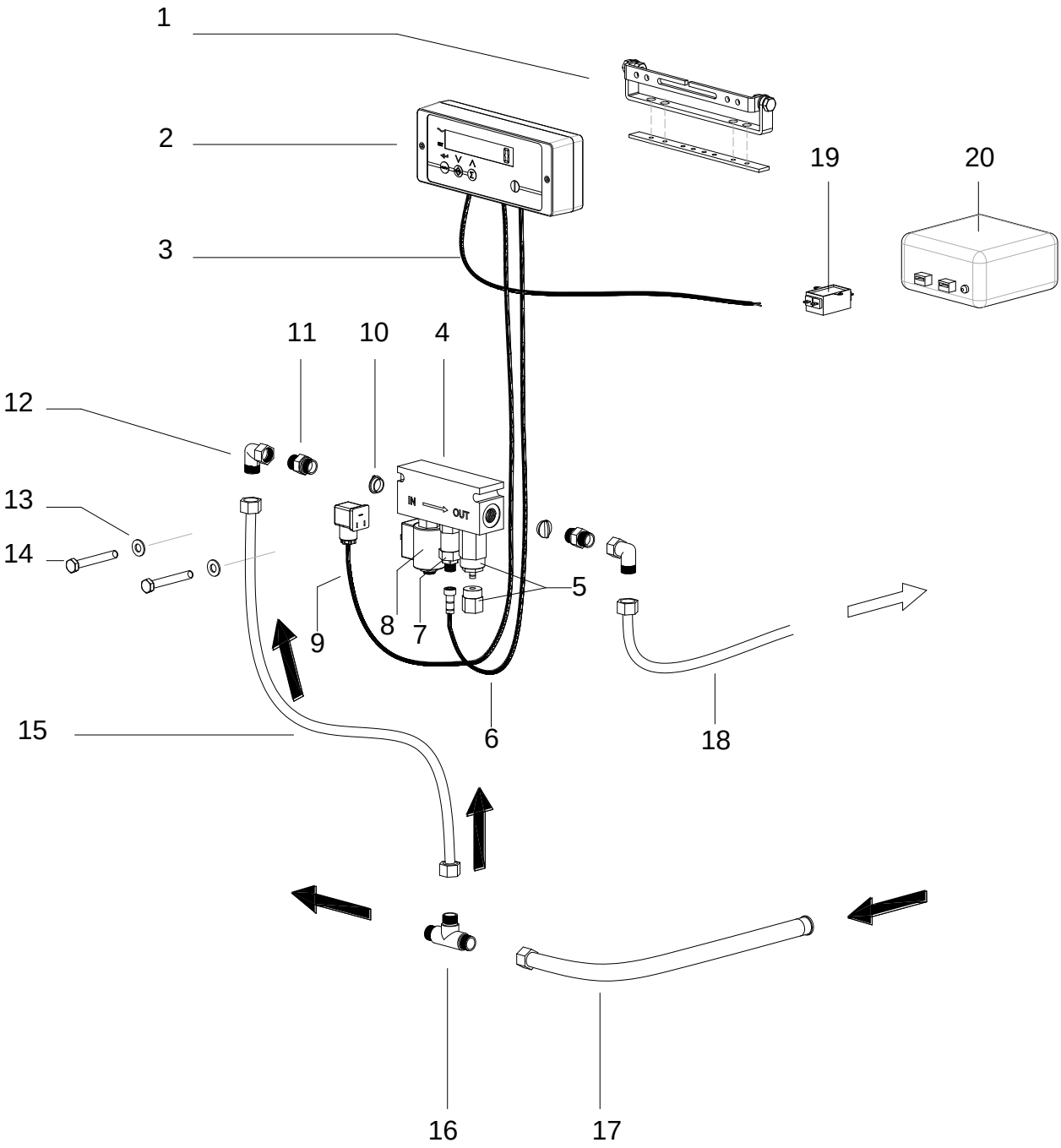


Type B: 2 side cylinders





4. Exploded view & parts list



Position	Designation	Quantity	Supplier
1	Bracket indicator	1	RAVAS
2	Indicator	1	RAVAS
3	12V power calbe	1	RAVAS
4	Hydraulic block	1	RAVAS
5	Flow adjustment valve + protection cap	1	RAVAS
6	Sensor cable	1	RAVAS
7	Oil pressure sensor	1	RAVAS
8	Electric valve	1	RAVAS
9	Control cable / plug	1	RAVAS
10	Plug	2	RAVAS
11	Thread adaptor:G3/8” or G3/4” -> NPTF	2	RAVAS (USA only)
12	Elbow coupling (G3/8” / G3/4”)	2	Material handling dealer
13	Washer	2	Material handling dealer
14	Hexagonal bolt	2	Material handling dealer
15	Hydraulic hose or pipe (pressure side)	1	Material handling dealer
16	T-piece	1	Material handling dealer
17	Hydraulic hose or pipe	1	Material handling dealer
18	Hydraulic hose or pipe (return side)	1	Material handling dealer
19	Netfilter	1	RAVAS*
20	DC-DC power converter	1	RAVAS*

* Not needed when the indicator is supplied with an integrated 3A power converter or regulator. If so, the label “CONVERTER INSIDE” or “REGULATOR INSIDE” must be sticked onto the indicator and power cable.
If needed, they parts 19 and 20 can be ordered additionally at RAVAS (recommended)

5. Before the installation

Before you start with the installation, check the forklift truck on the following points:

5.1 Capacity of the forklift truck

The RCS *PLUS* can be installed on forklift trucks with a capacity of maximum 99 ton.

5.2 Maximum pressure in the hydraulic system

The RCS *PLUS* will operate optimally at an oil pressure up to 350 bar.

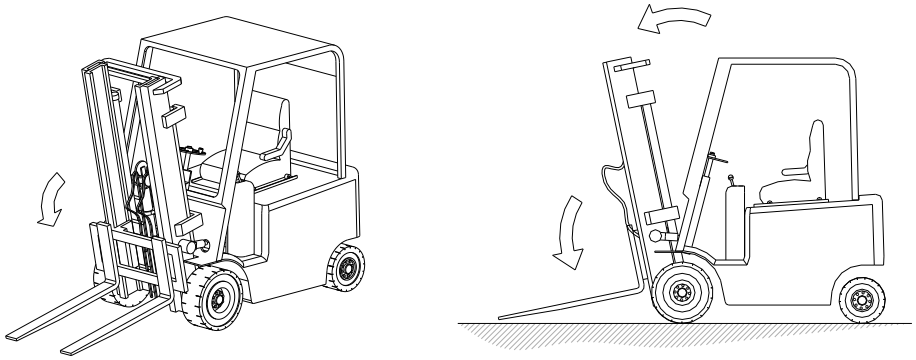
5.3 Battery voltage of the forklift truck

The most common voltages for forklift trucks are 12, 24, 48 and 80 VDC. The RCS *PLUS* operates on 12 VDC. In cases where the battery voltage is greater than 12 VDC, the system requires a DC-DC power converter with an output voltage of 12 VDC.

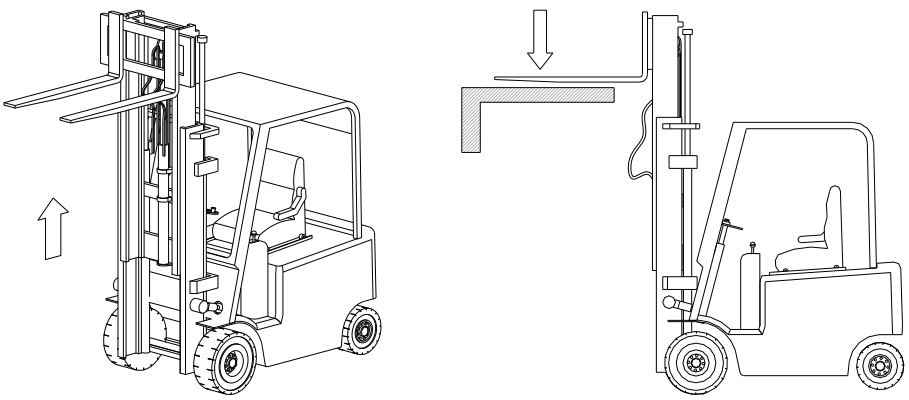
5.4 Making the system pressure free

Before installation of the RCS *PLUS*, the hydraulic system of the fork lift truck must be pressure free. There are two ways to do this:

Option 1: Place the forks on the ground in their lowest position and make the hydraulic system pressure free, by tilting the mast forwards. Be sure the chain is slack!



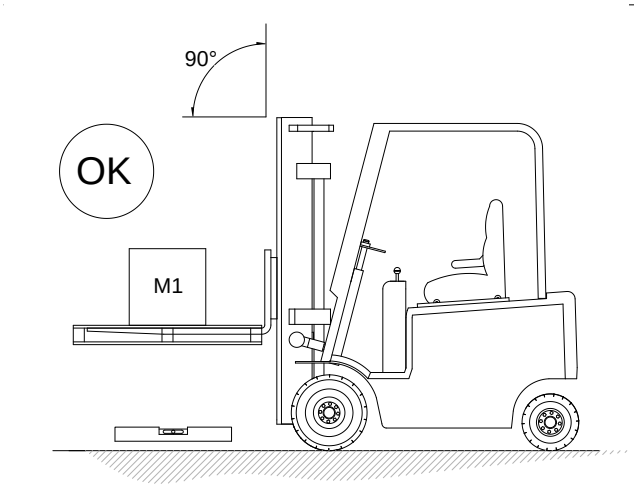
Option 2: Lift the forks and position them on top of a supporting surface. Make the hydraulic system pressure free, by lowering the lifting cylinder into its lowest position. Be sure the chain is slack!

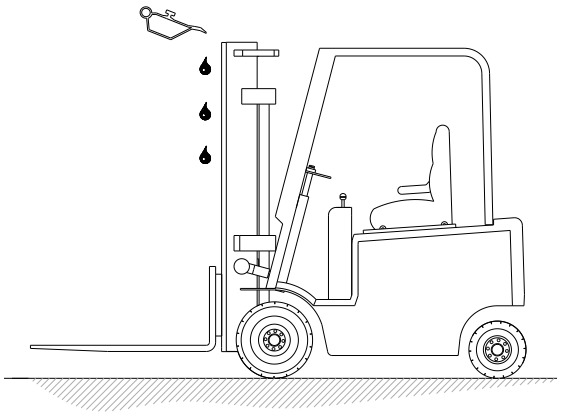


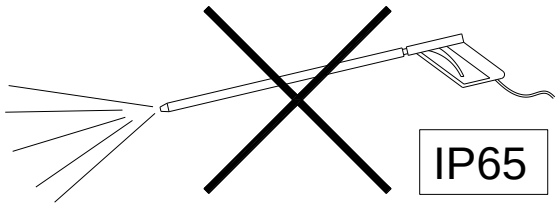
5.5 The condition of mechanical components of the forklift truck

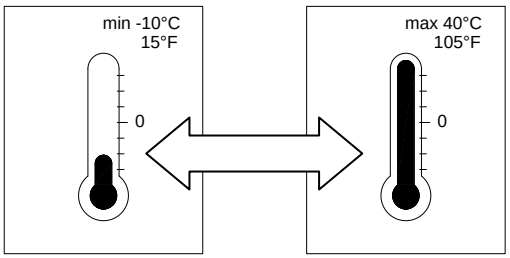
After installation of the RCS *PLUS* system on the forklift truck, the truck is part of the weighing system. In particular the mechanical parts of the forklift truck, such as the mast, mast roles and bearings, will influence the accuracy of the weightings. For this reason it is important that these components are in good condition:

- no local wear in the mast of the fork lift truck
- clean the system
- good lubrication of the mast and chains
- regular maintenance so that the condition of the system is constant
- when lifting and decreasing the forks no whistling and cracking sounds from the mast



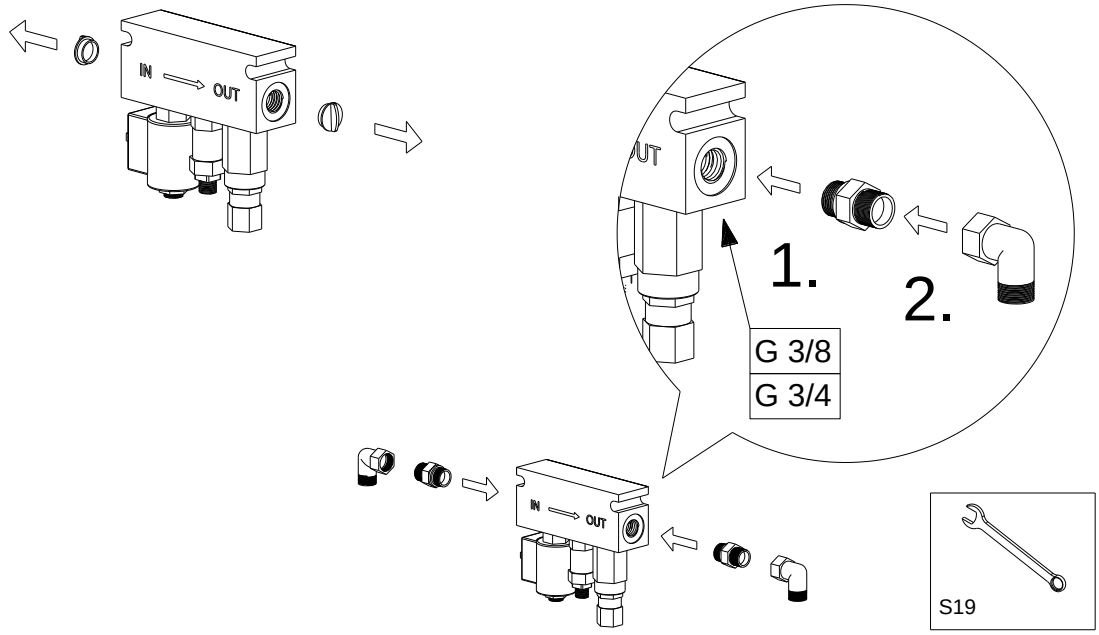




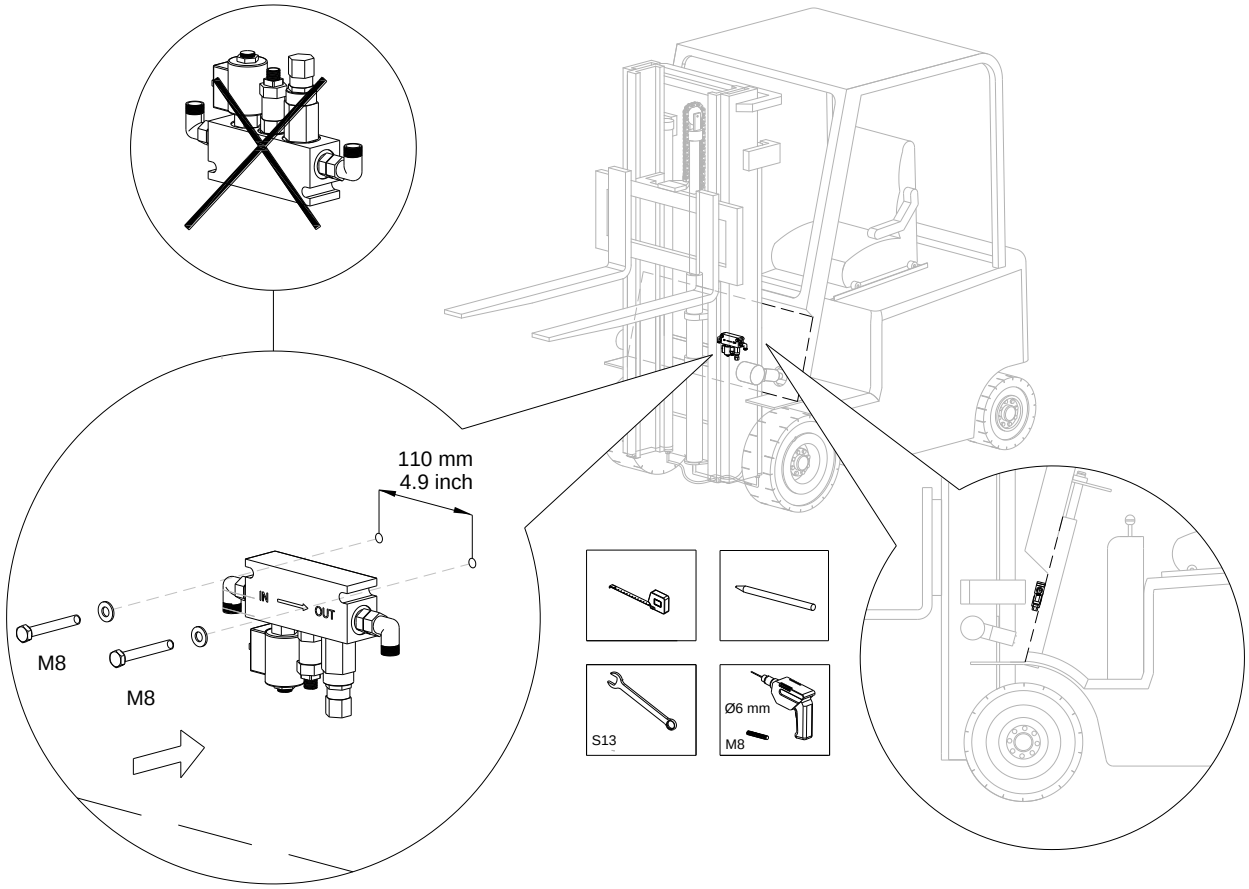


6. Installation

6.1 Connecting the threaded joints to the hydraulic block *(USA only)*

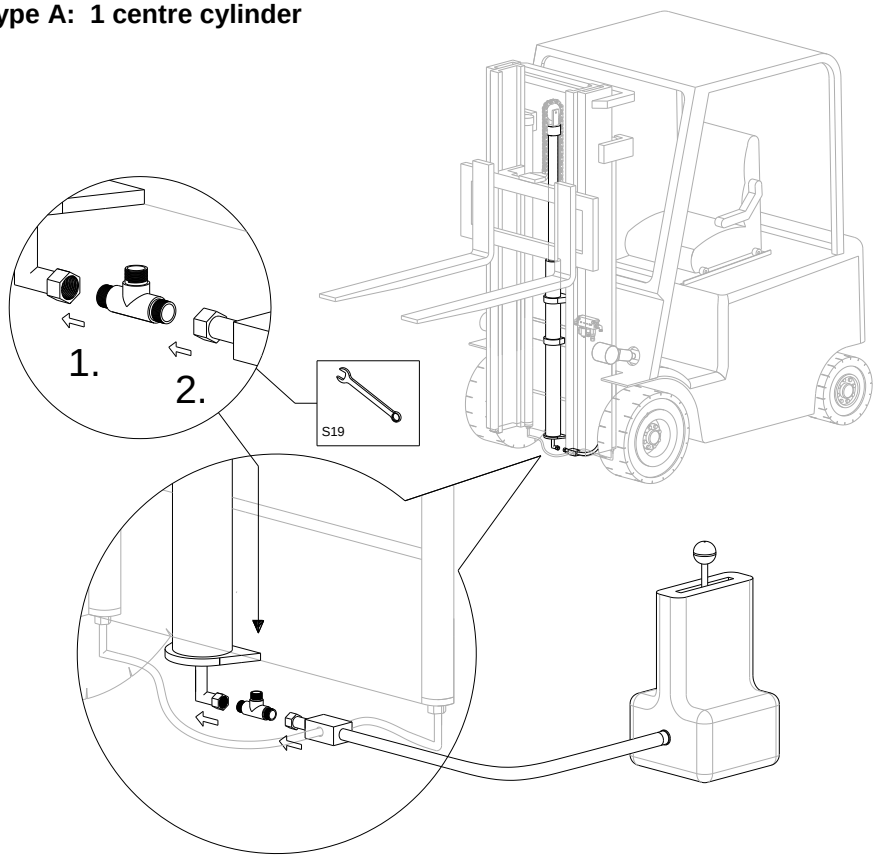


6.2 Installing the hydraulic block



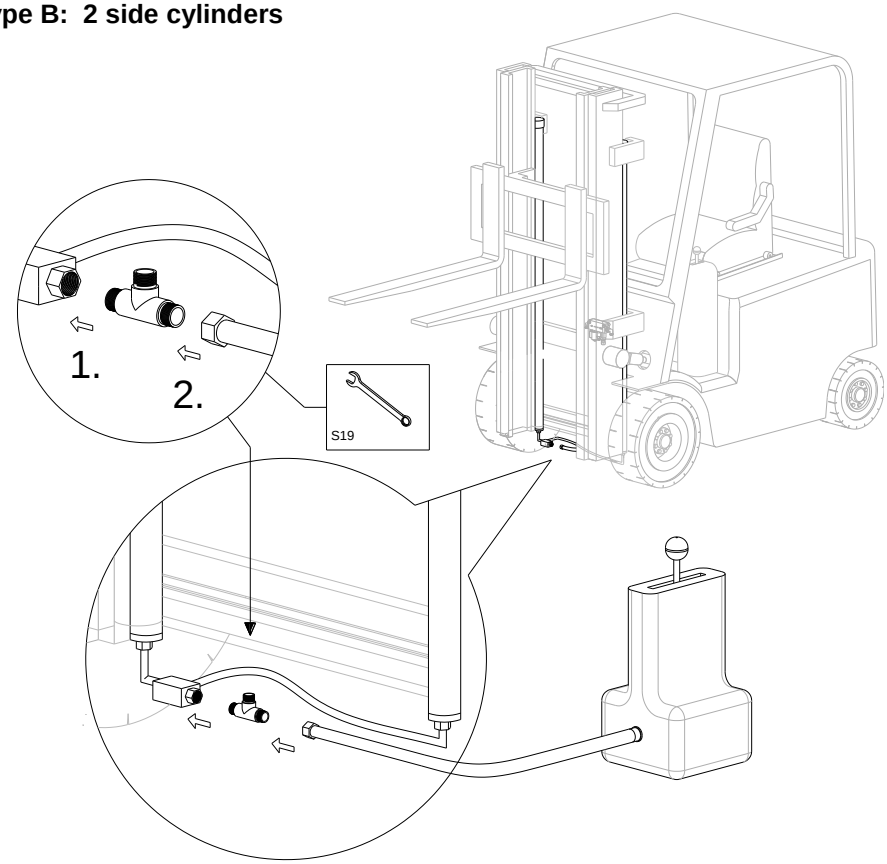
6.3 Installing the T- piece

Type A: 1 centre cylinder



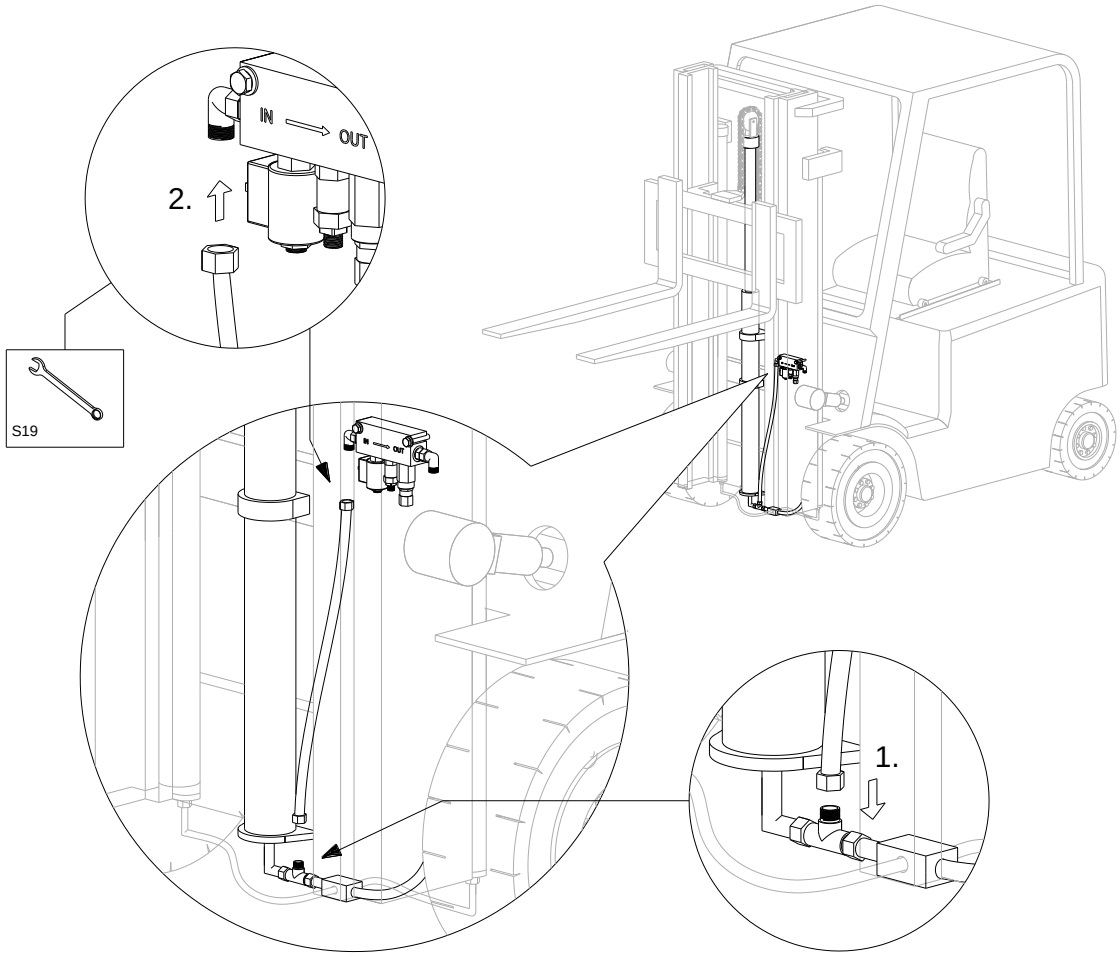
Mount a T-piece in the pressure line of the truck, close to the cylinder, to make the split point for the RCS *plus*

Type B: 2 side cylinders

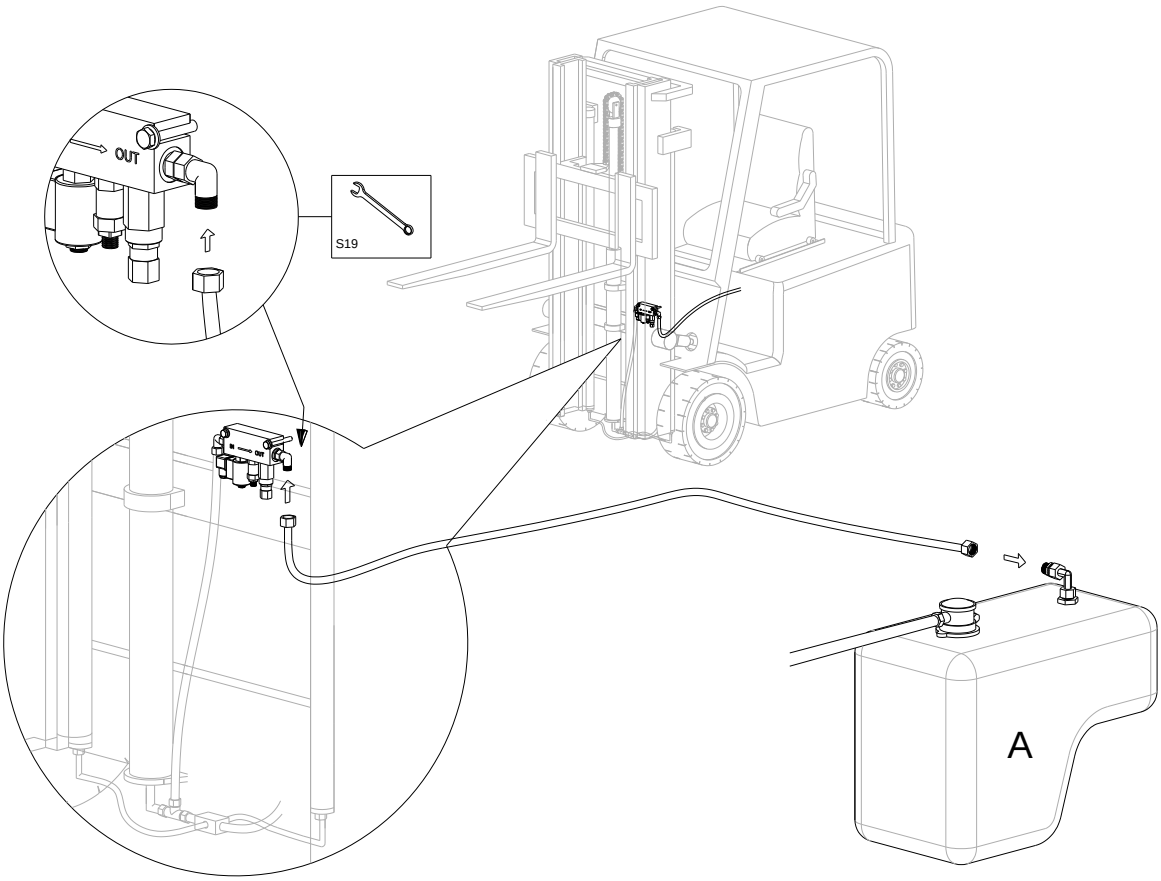


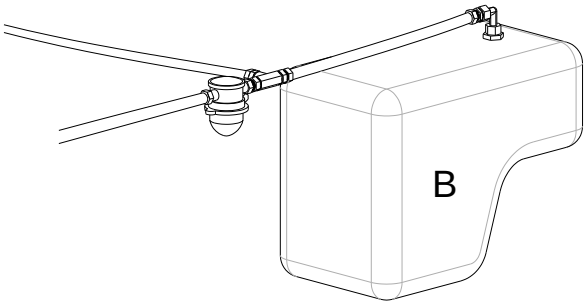
Mount a T-piece in the pressure line of the truck, close to both cylinders, to make the split point for the RCS *plus*

6.4 Short hydraulic line from the T-piece to the inlet of the hydraulic block

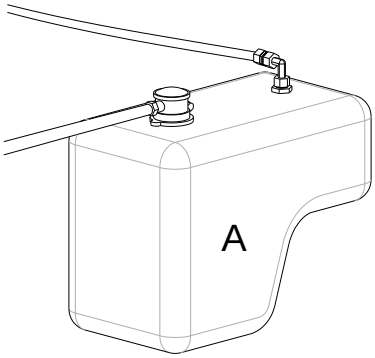


6.5 Hydraulic line from the outlet of the hydraulic block to the return line of the truck





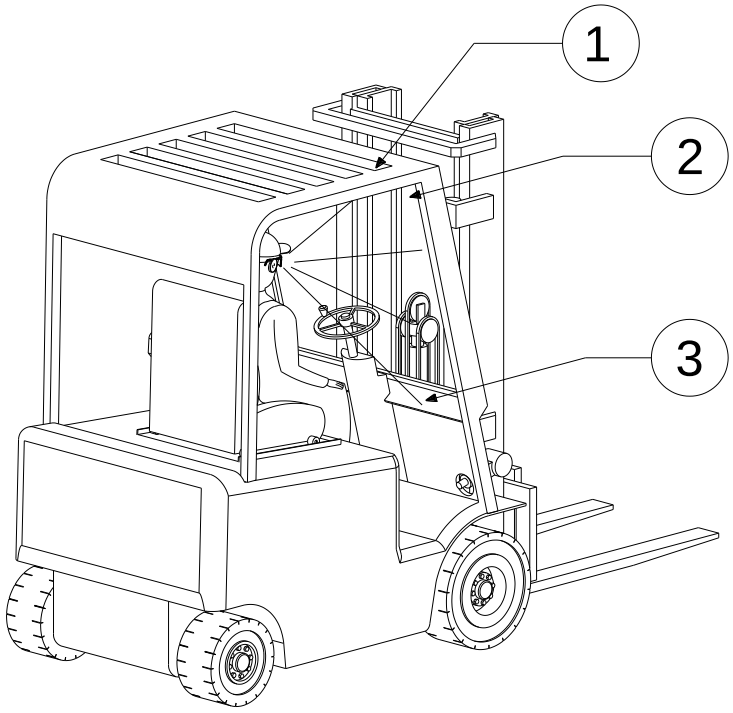
B. Connect with the existing main return line, after the oil filter (if installed)

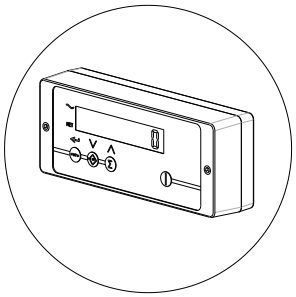


A. Connect directly to the oil reservoir

Do not place an oil filter in the return line of the RCS *PLUS*!

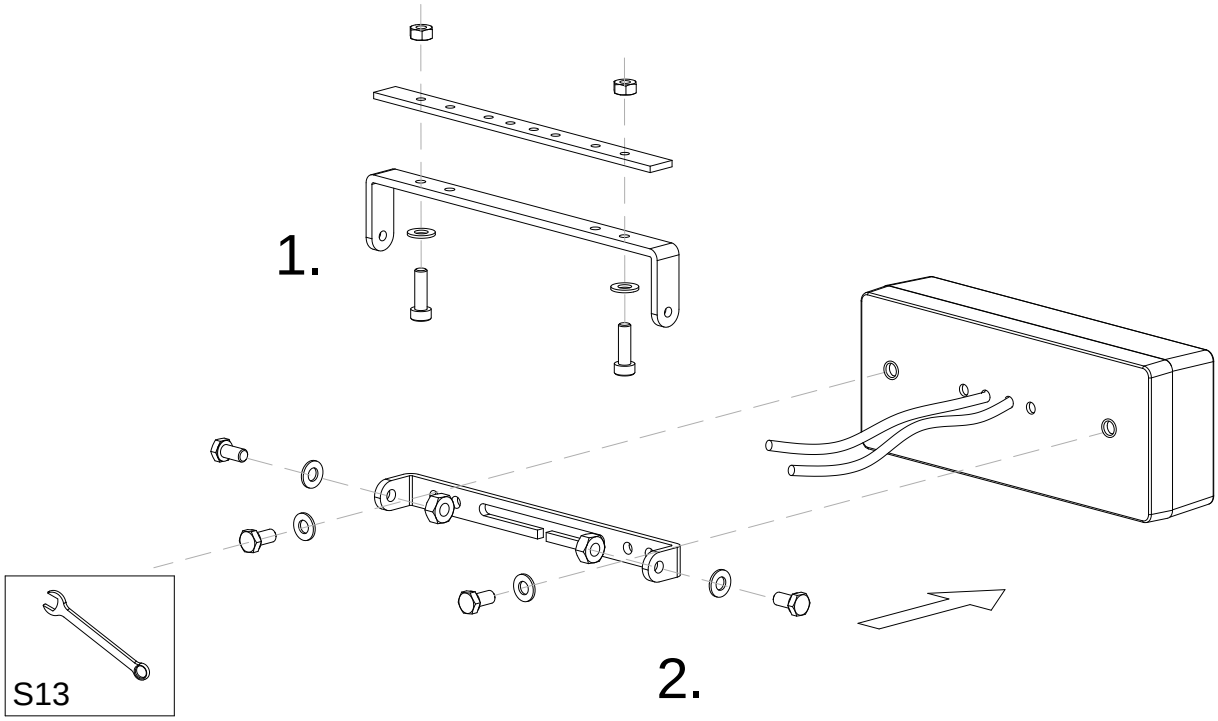
6.6 Position of the indicator



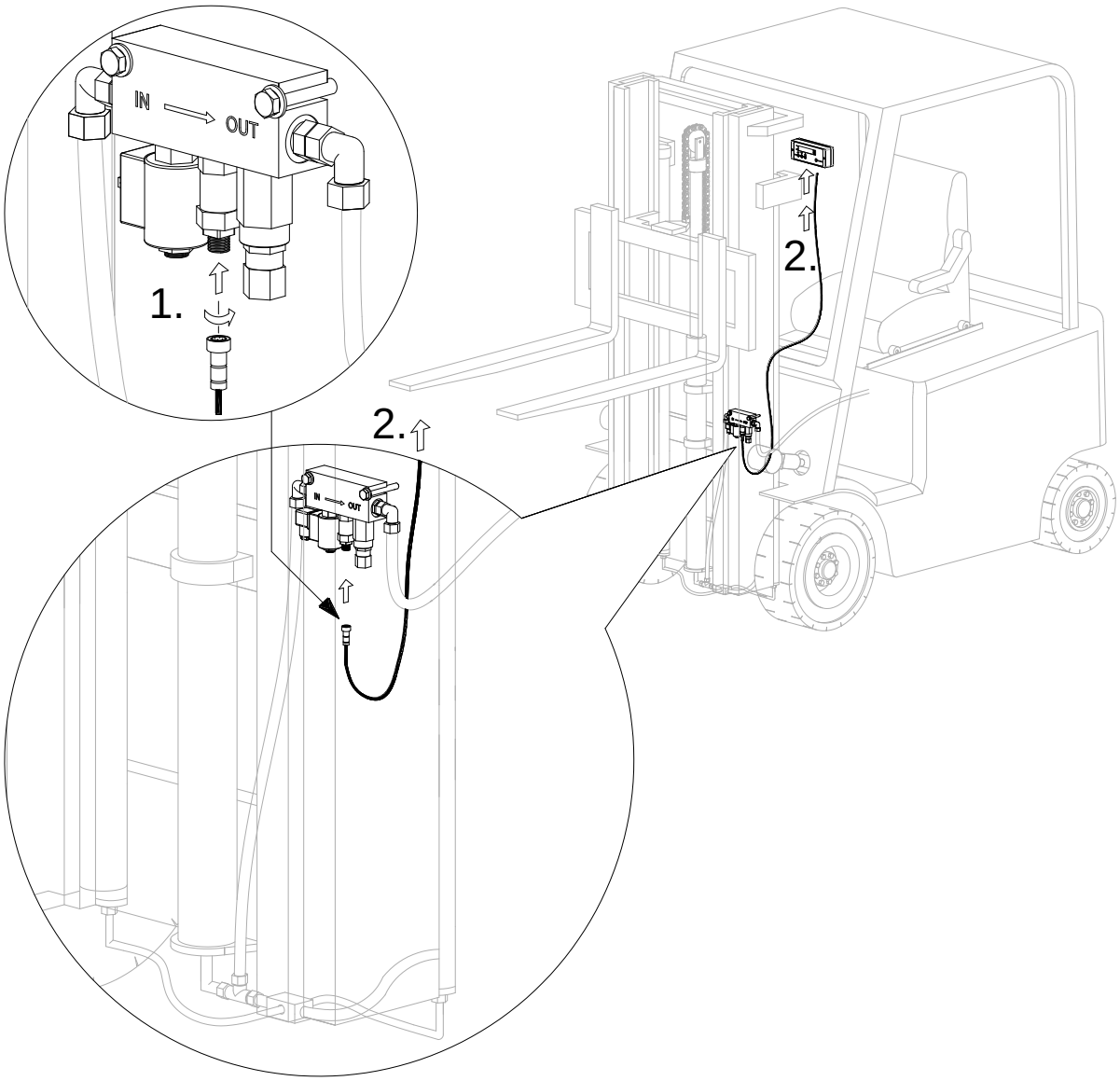


The indicator should be easy to reach and read out !

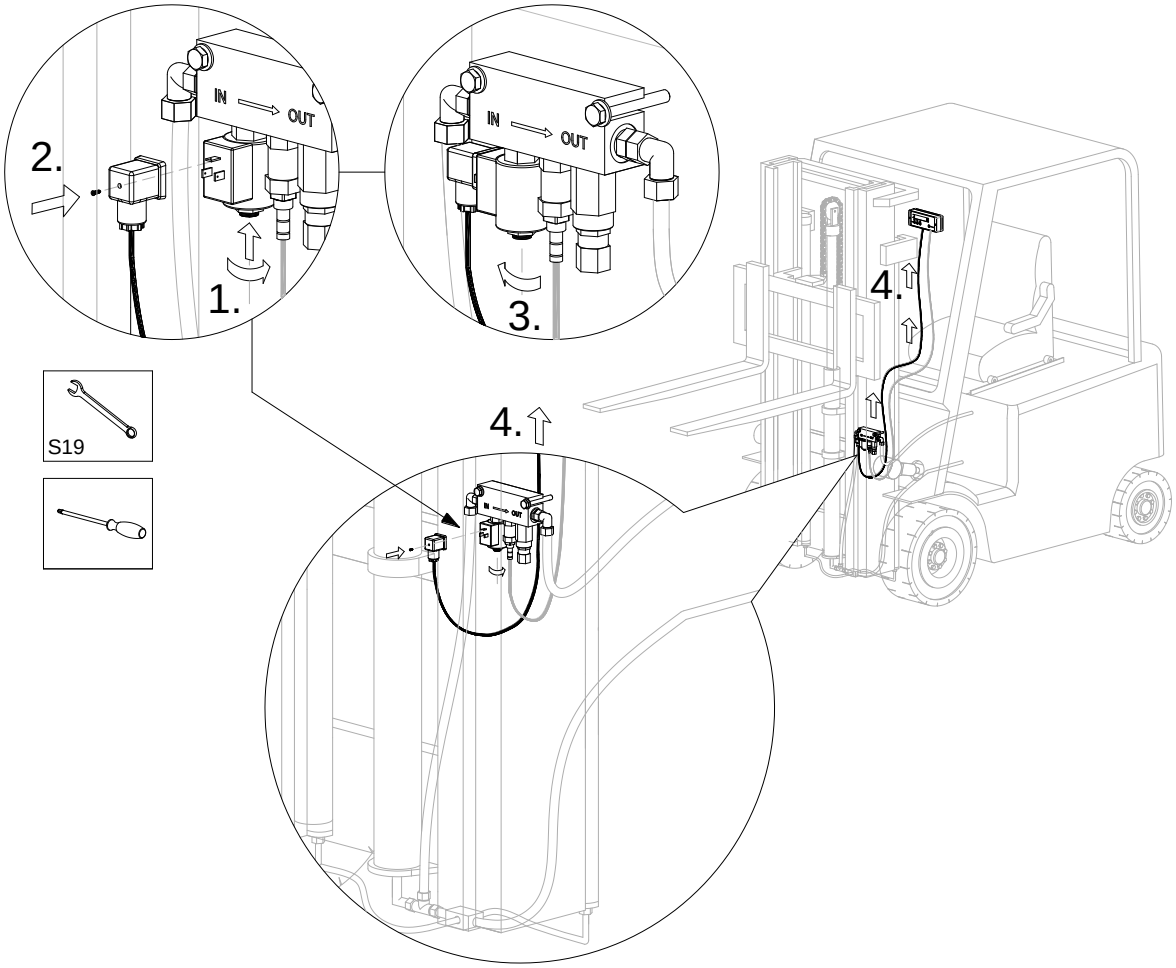
6.7 Installing the indicator



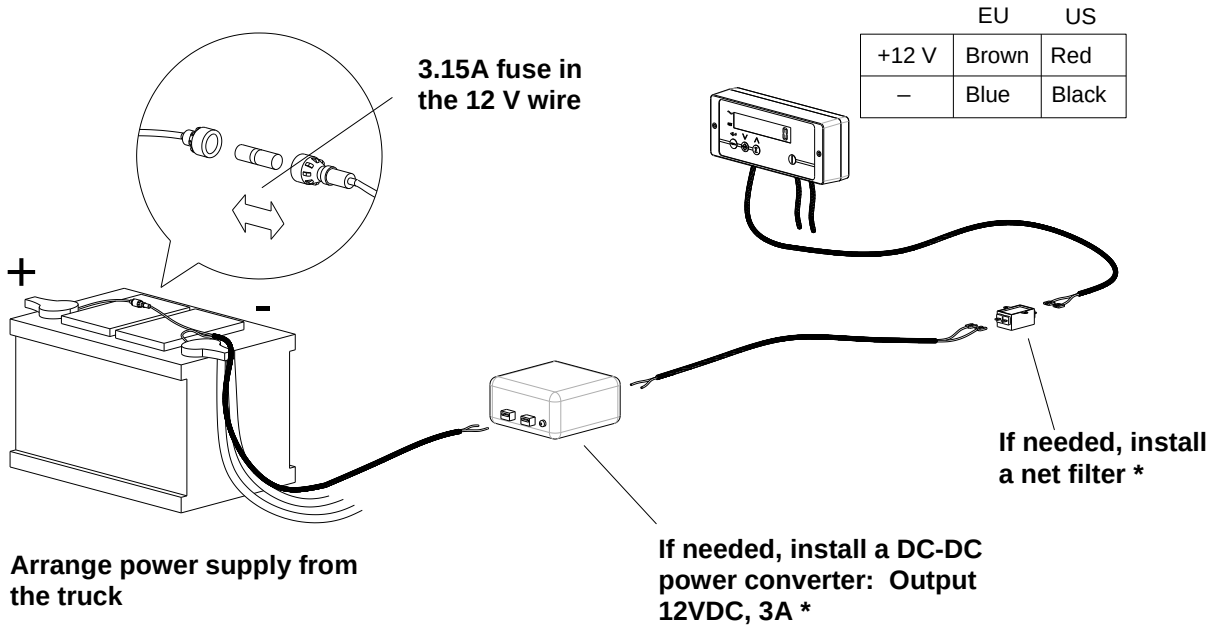
6.8 Connecting the sensor cable



6.9 Connecting the cables for the electric valve and sensor



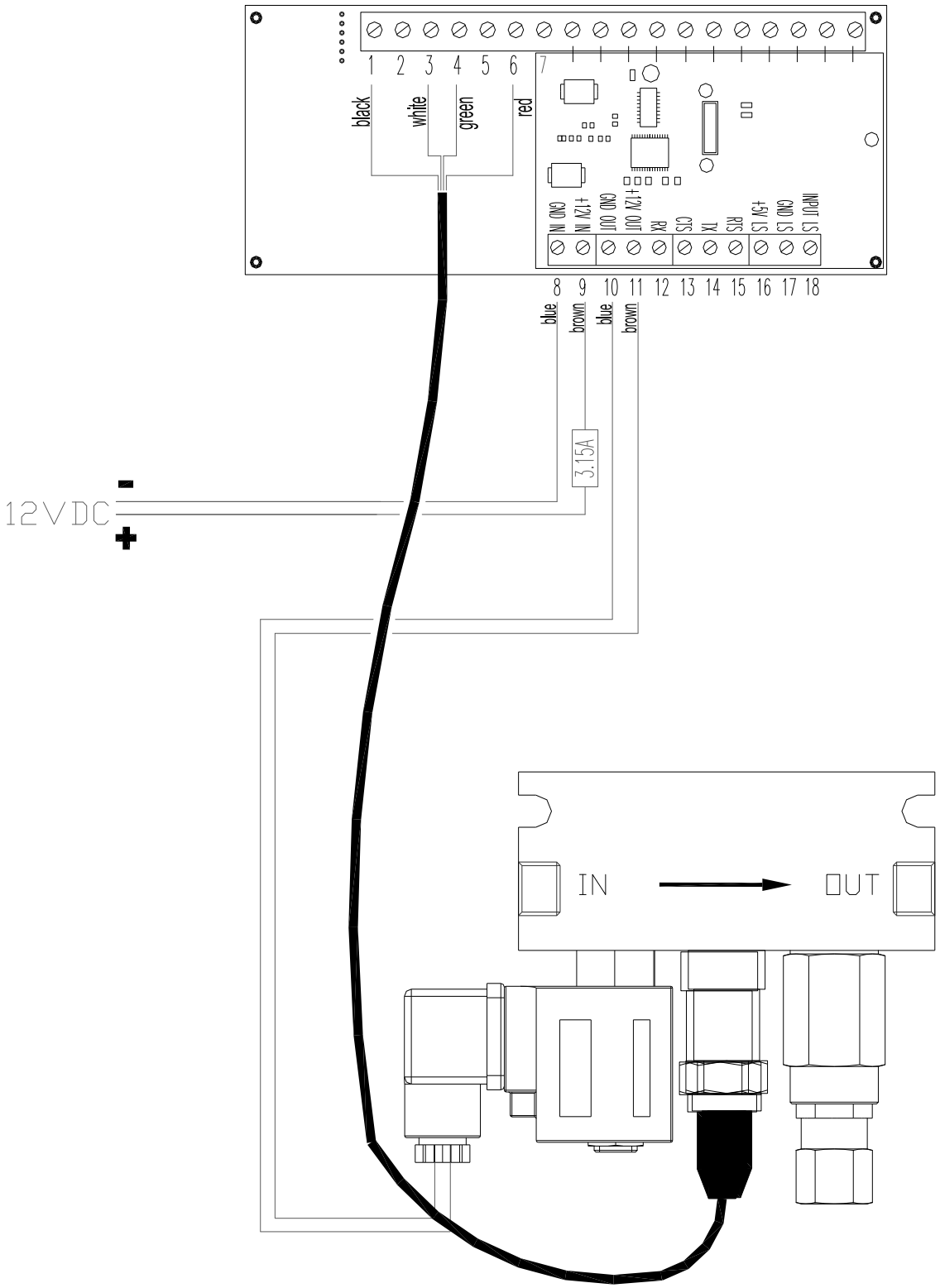
6.10 Connecting the power supply cable


3.15A fuse in the 12 V wire
+
-
Arrange power supply from the truck
If needed, install a DC-DC power converter: Output 12VDC, 3A *
If needed, install a net filter *

	EU	US
+12 V	Brown	Red
–	Blue	Black

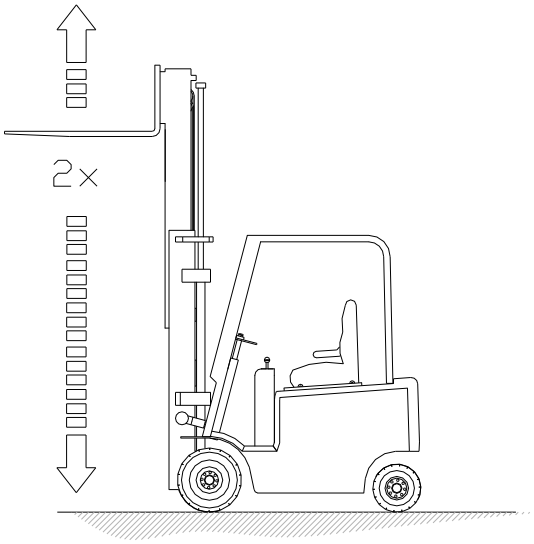
* Not needed when the indicator is supplied with an integrated 3A power converter or regulator. If so, the label “CONVERTER INSIDE” or “REGULATOR INSIDE” must be sticked onto the indicator and power cable.

6.11 Connecting the system wires *(see electrical diagram)*

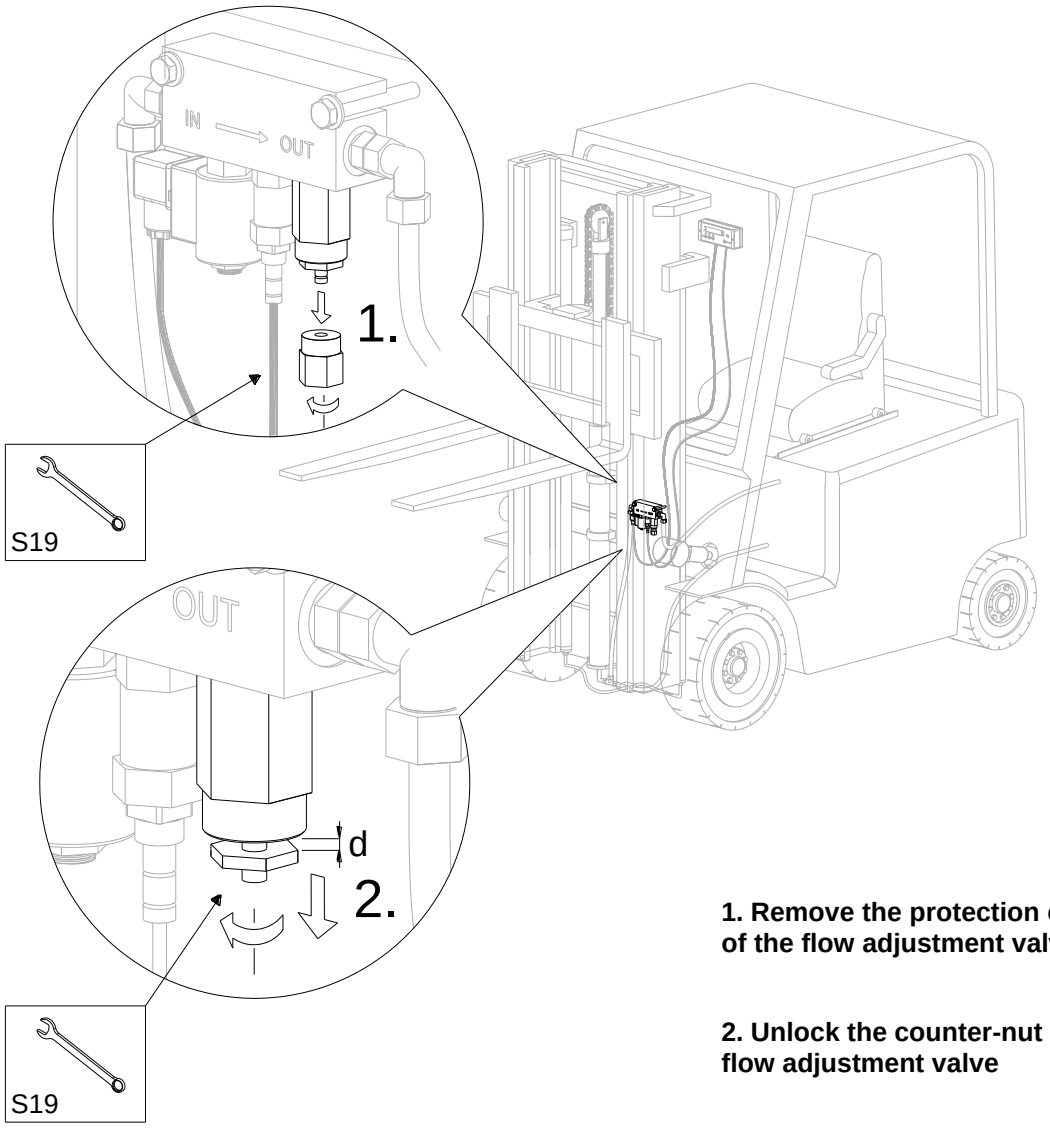


6.12 Removing possible air out of the hydraulic system

Lift the fork to maximum height for two times to remove al possible air out of the hydraulic system



6.13 Adjusting the position of the flow adjustment valve

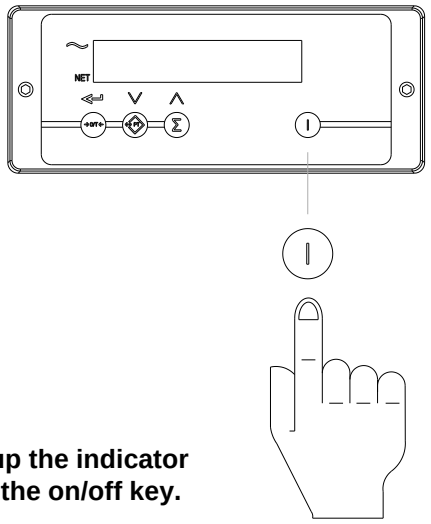


1. Remove the protection cap of the flow adjustment valve

2. Unlock the counter-nut of the flow adjustment valve

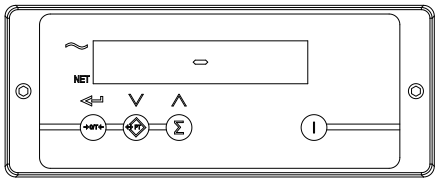
6.14 Checking if the system functions correctly

1

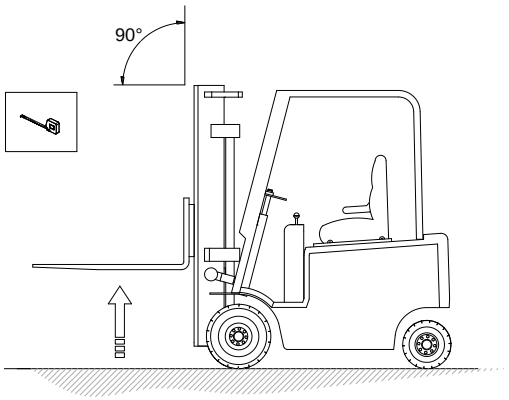


Start up the indicator
Press the on/off key.

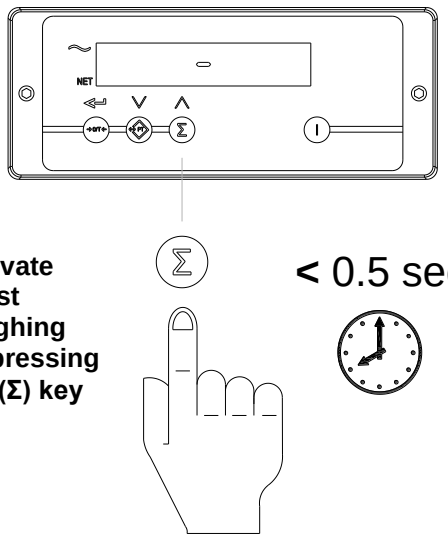
2



3



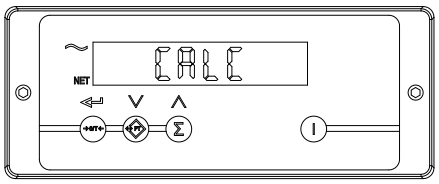
4



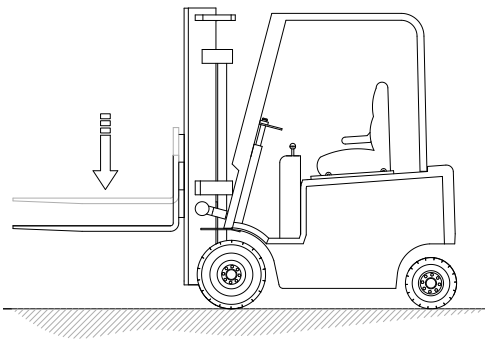
Activate a test weighing by pressing the (Σ) key

< 0.5 sec

5

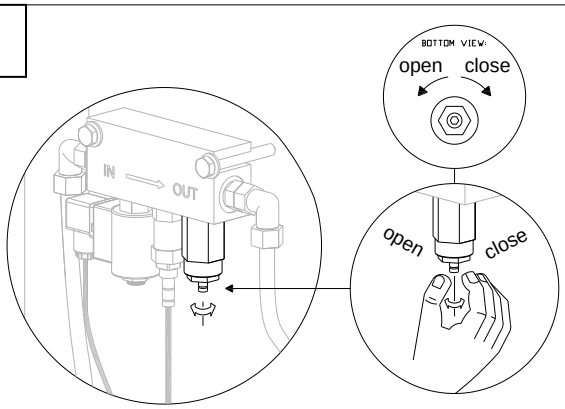


6



The forks should go down.

7

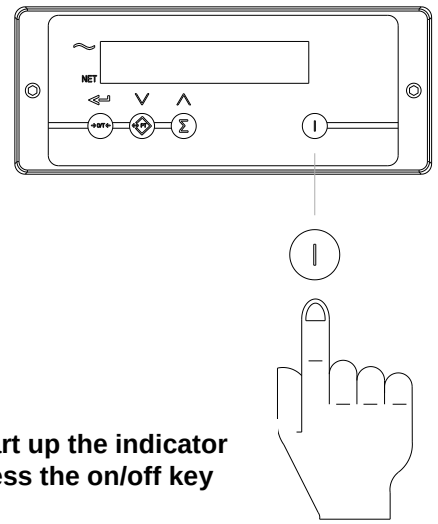


If not, open the flow adjustment valve by turning the adjustment nipple counter-clockwise.

7. Calibration

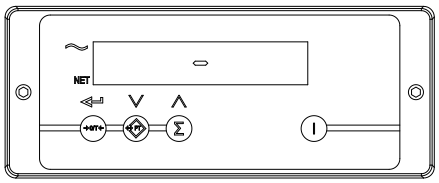
7.1 Tuning the lowering speed of the forks

1

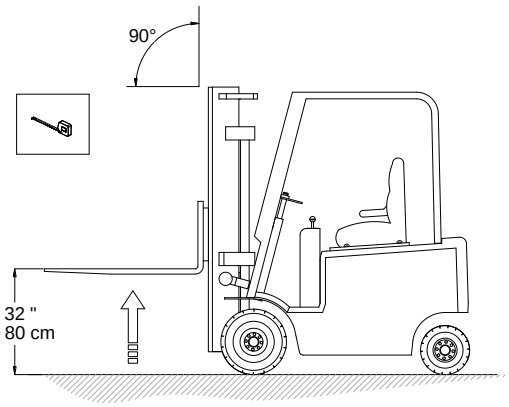


Start up the indicator
Press the on/off key

2

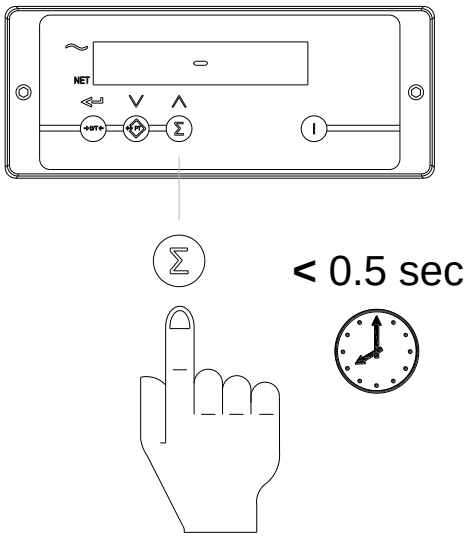


3

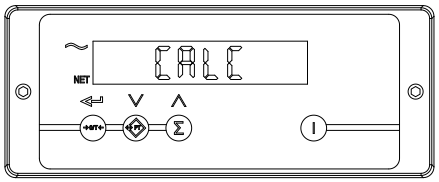


Lift the empty forks up
to the reference height

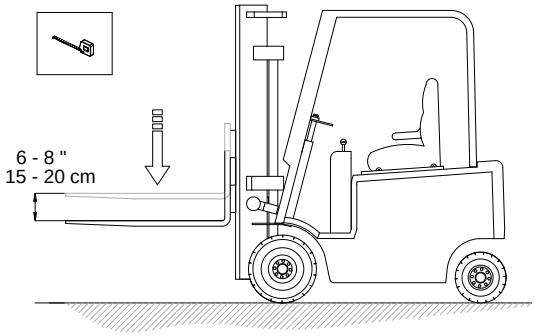
4



5



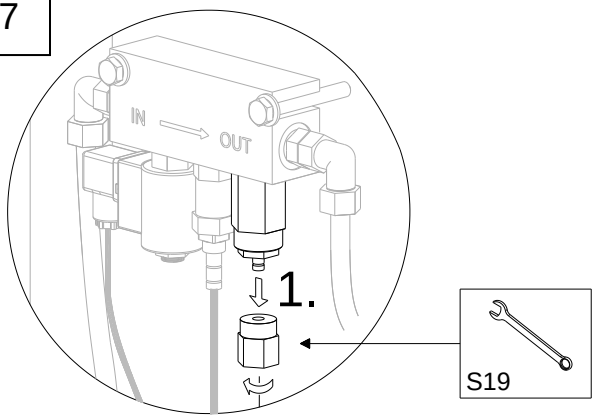
6



The forks should go down with a constant speed. The downwards movement should be in between 6–8 inch or 15-20cm.
Also check it with loaded forks.

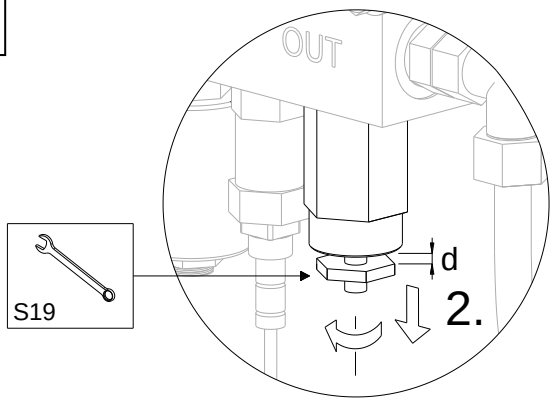
If needed, adjust the position of the flow adjustment valve (steps 7 -10)

7



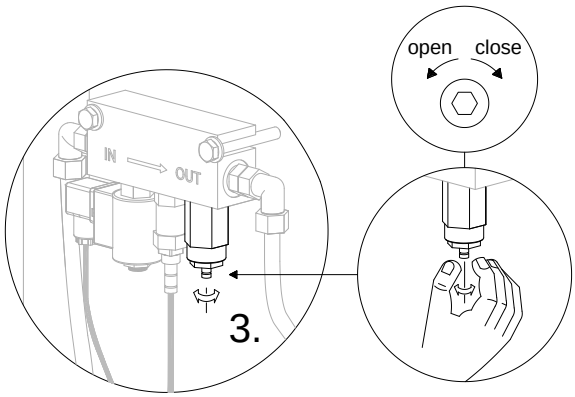
Remove the protection cap of the flow adjustment valve

8

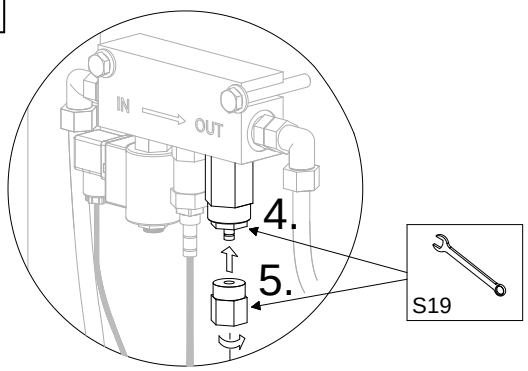


Unlock the counter-nut of the flow adjustment valve

9

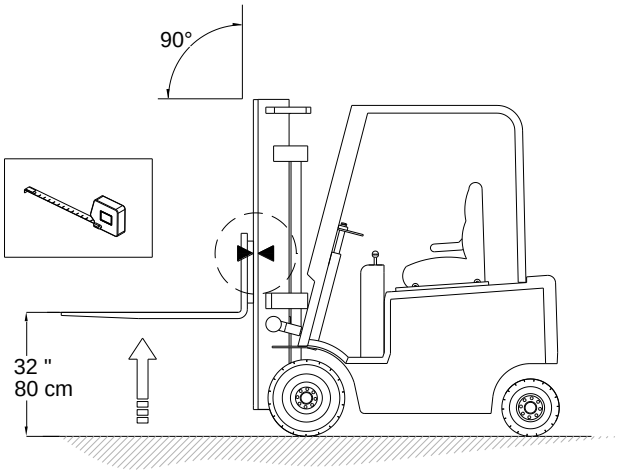


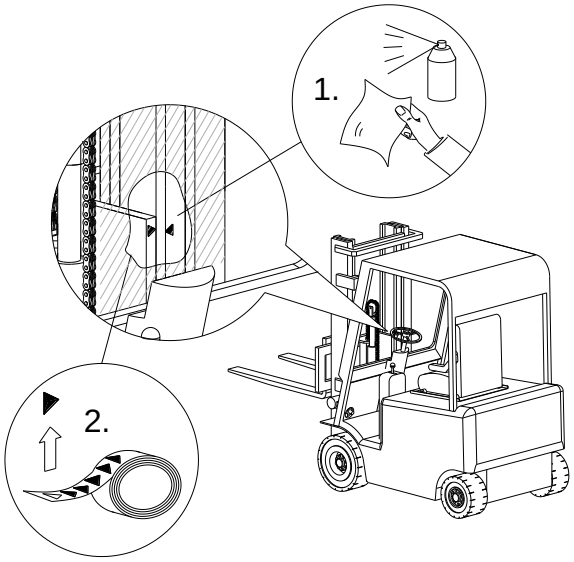
10



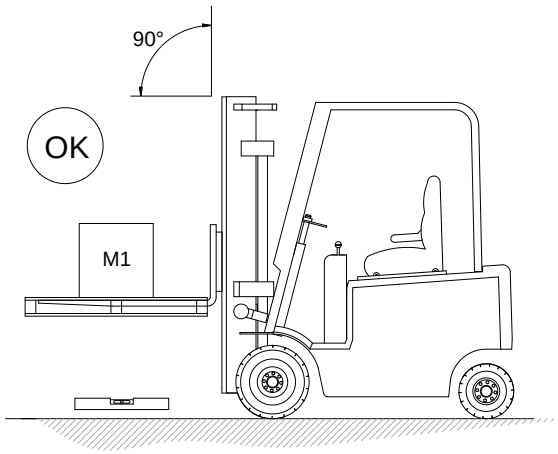
When OK, lock the counter-nut of the flow adjustment valve and mount the protection cap

7.2 Marking the reference height



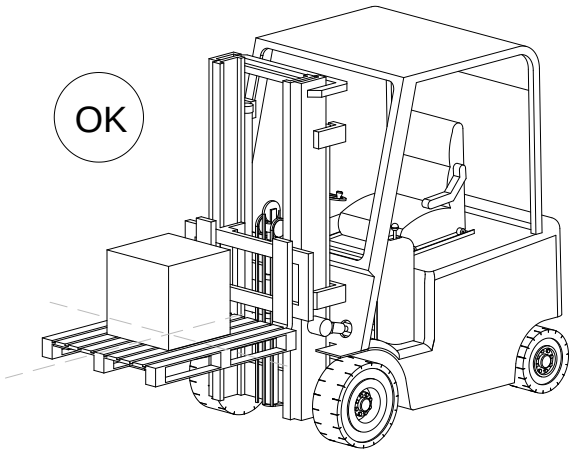


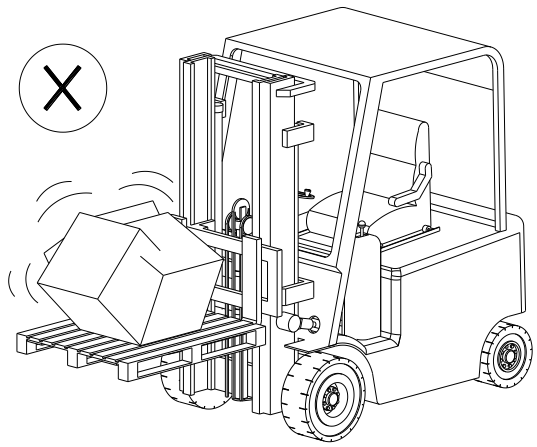
7.3 Preparing for calibration

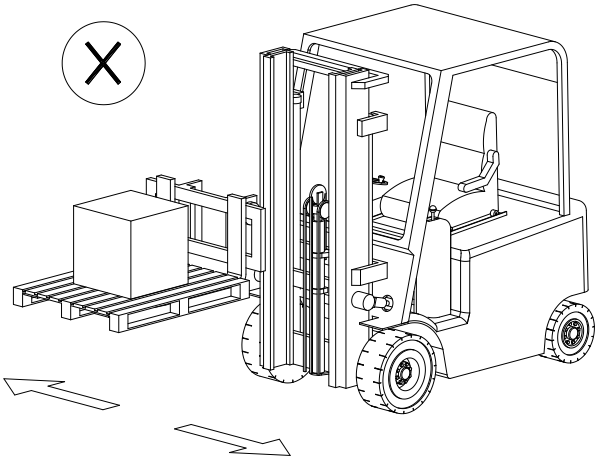


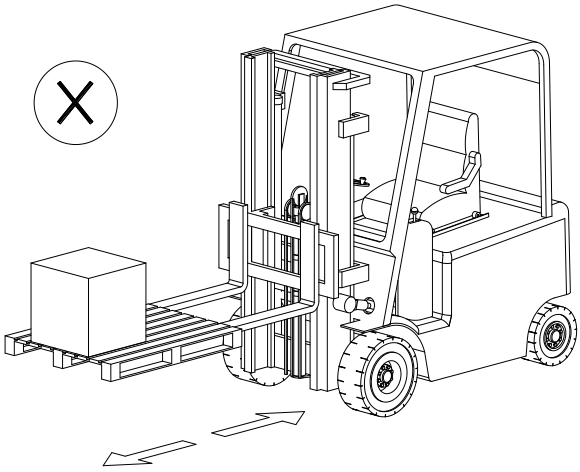
Calibration weight M1: +/- 2/3 of the truck's lifting capacity

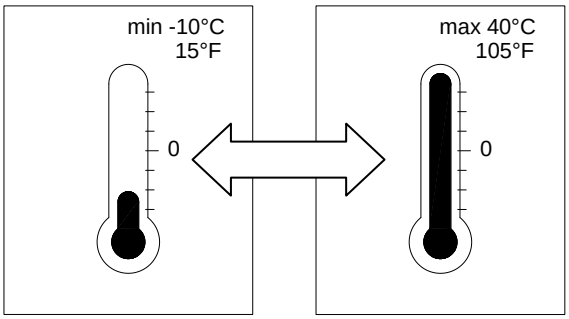
EXAMPLE #1: 2.2t truck => M1 = 1500





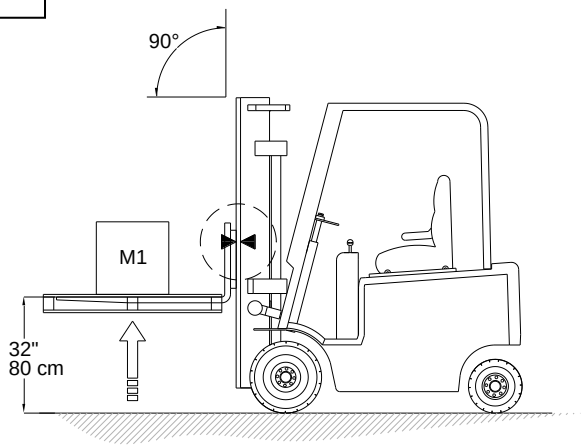




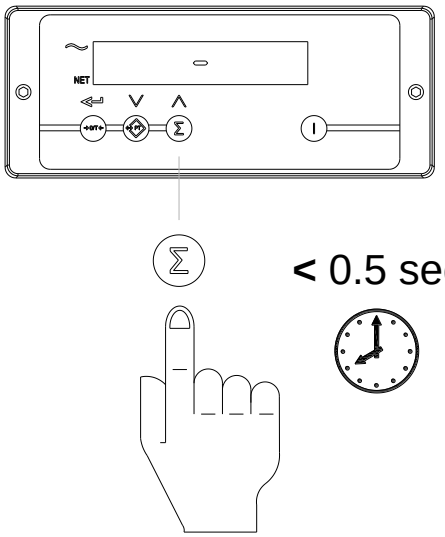


7.4 Working temperature of the forklift truck

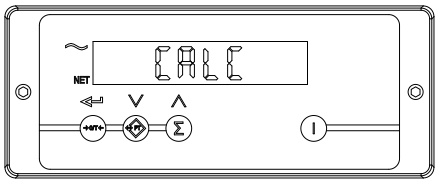
1



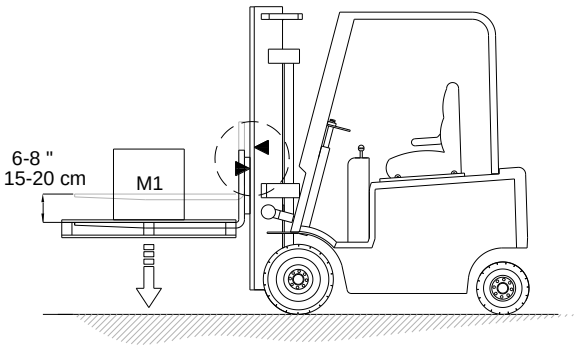
2



3



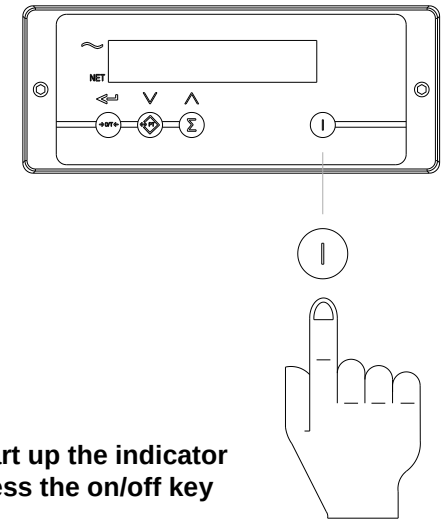
4



Repeat this cycle for 2 minutes

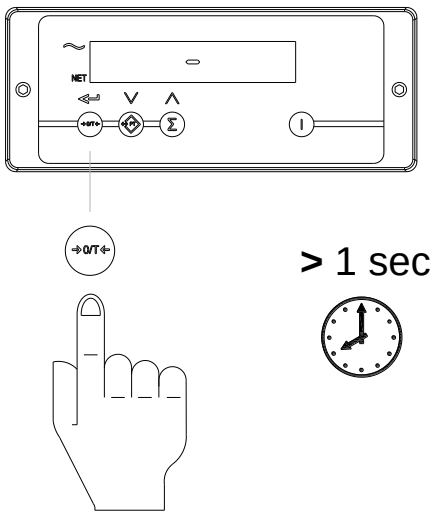
7.5 Zero calibration

1

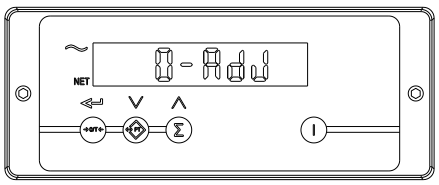


Start up the indicator
Press the on/off key

2

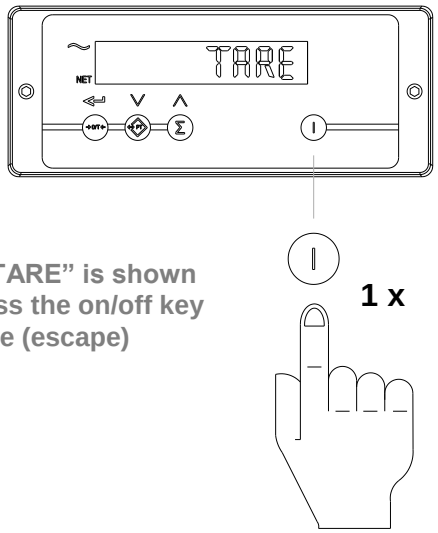


3



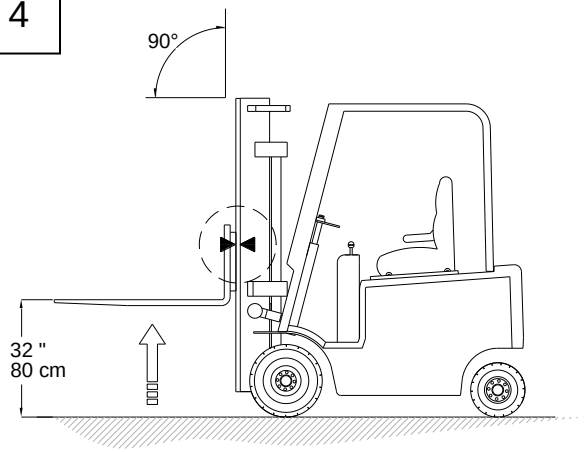
The display should show " 0 – AdJ "

X



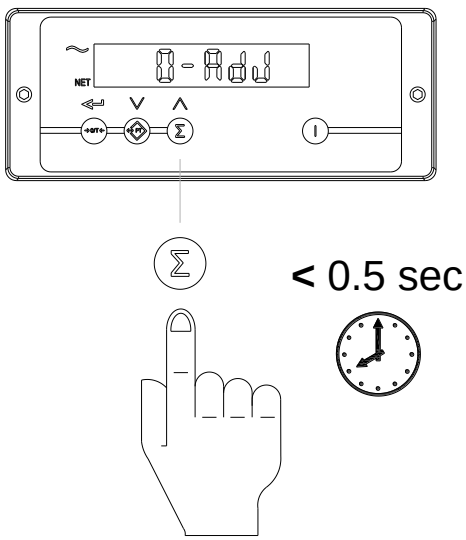
If "TARE" is shown press the on/off key once (escape)

4

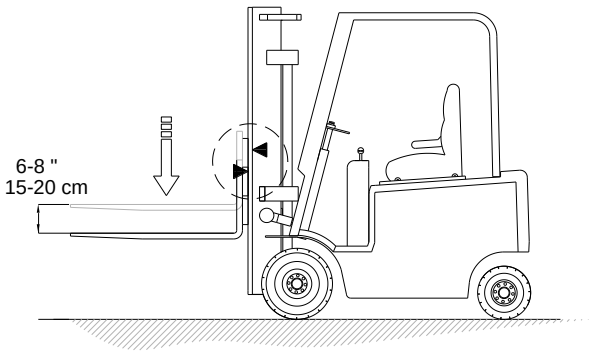


Lift the empty forks up to the reference height

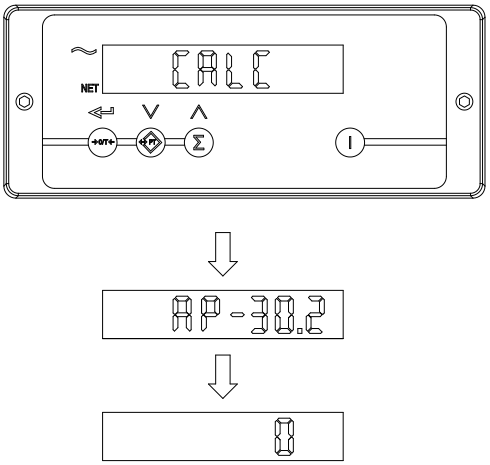
5



6

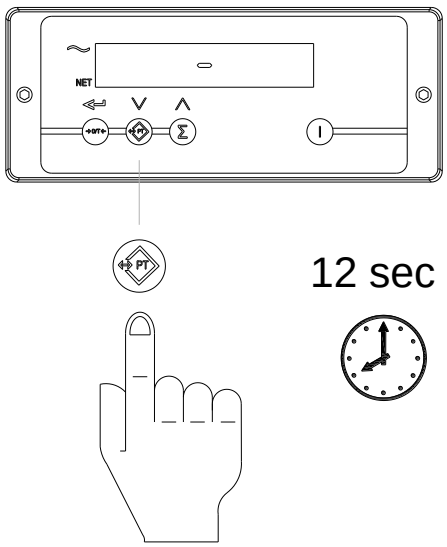


7



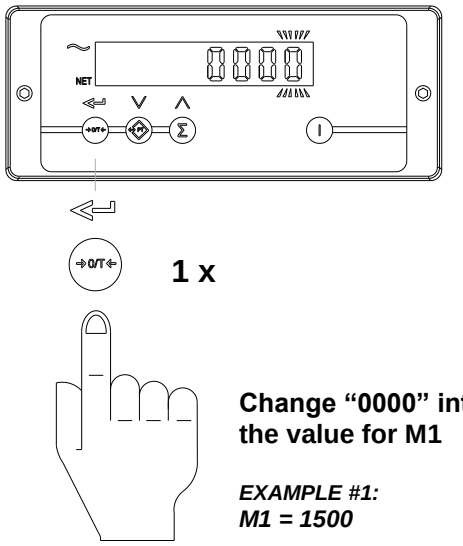
7.6 Span calibration

1



12 sec

2

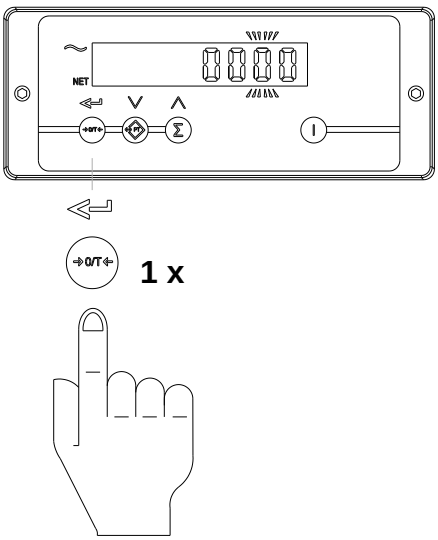


1 x

Change “0000” into the value for M1

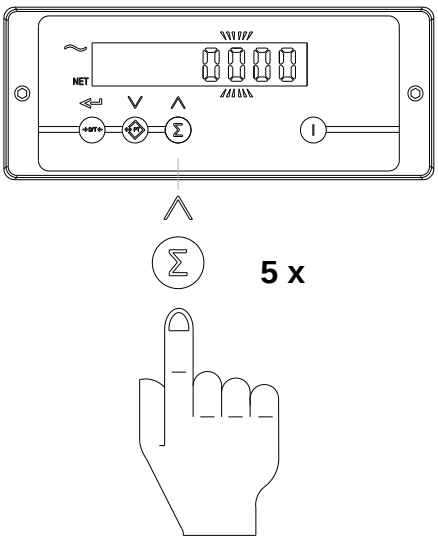
EXAMPLE #1:
M1 = 1500

3



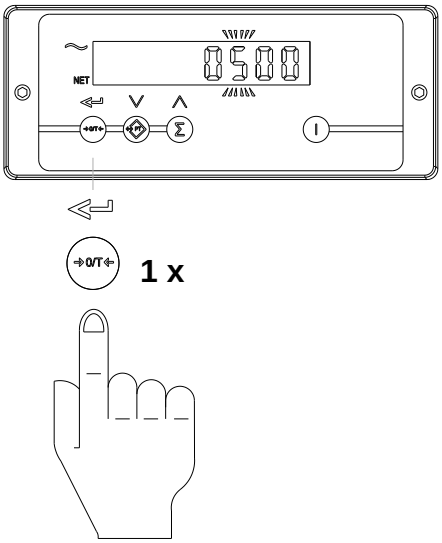
1 x

4



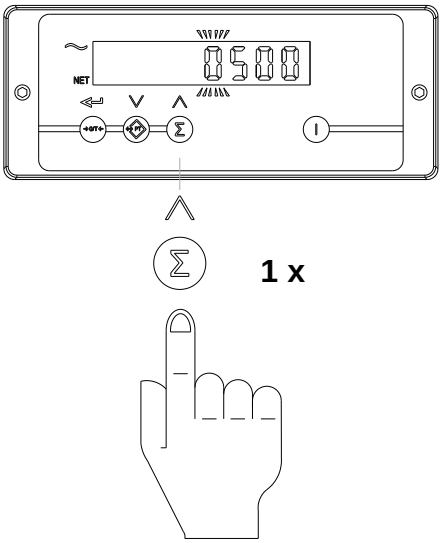
5 x

5



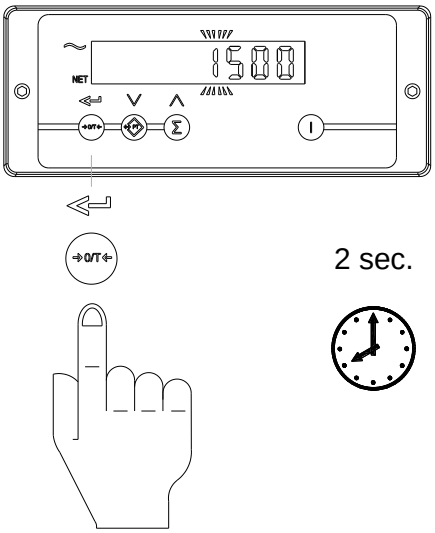
1 x

6

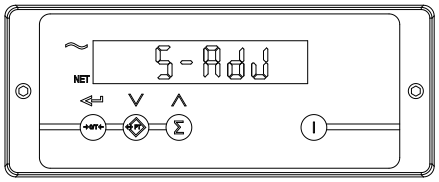


1 x

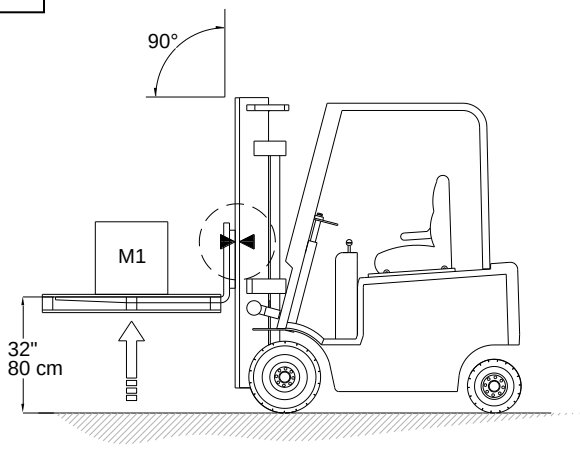
7


NET
1500
2 sec.

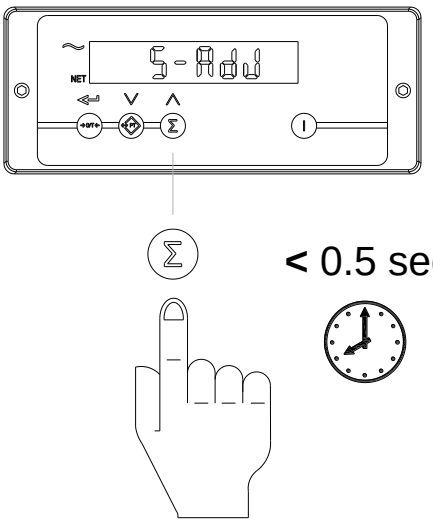
8


NET
S-Adj

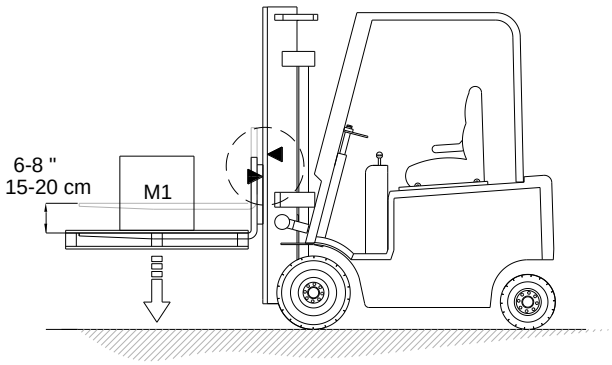
9


90°
M1
32"
80 cm

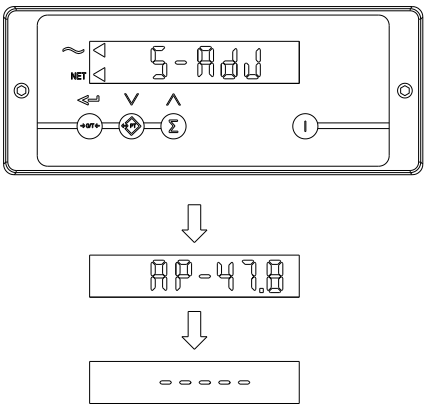
10


NET
S-Adj
< 0.5 sec

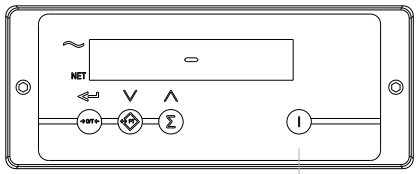
11


6-8 "
15-20 cm
M1

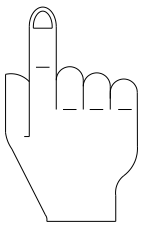
12


NET
S-Adj
AP-47.8

13



2 x

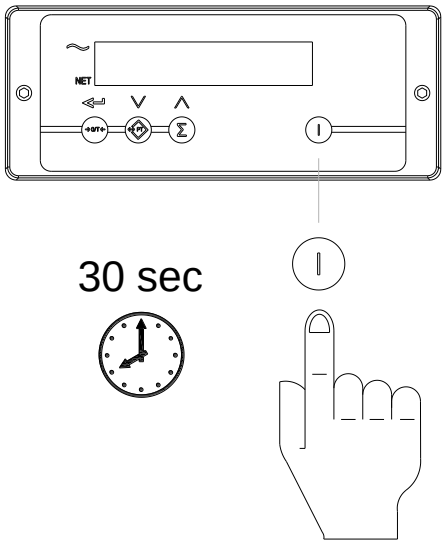


Press the on/off key twice to restart the indicator

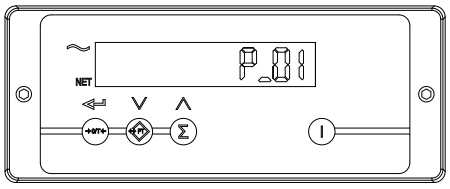
8. Parameter settings

8.1 Entering the parameter menu

1

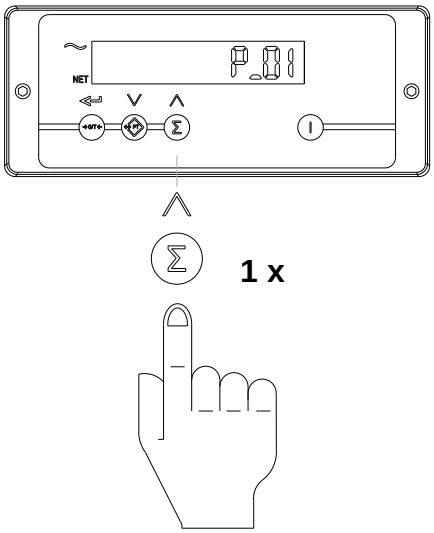


2



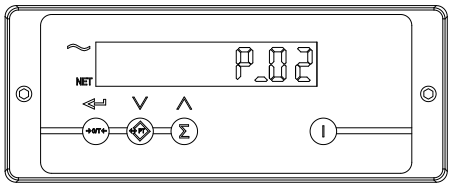
8.2 Changing the parameters

1



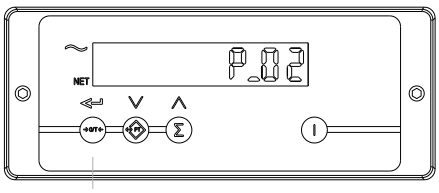
1 x

2



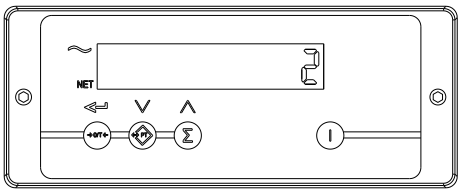
P_02 is the
Graduation step

3



1 x

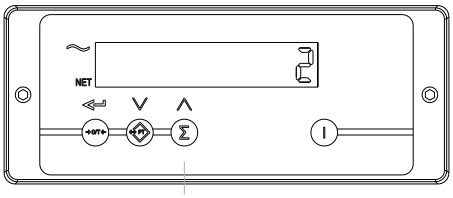
4



A graduation step of "2" is standard for trucks with a capacity up to 2500

TRUCK CAPACITY	GRADUATION STEP
100 - 2500	2
2600 - 5000	5
5100 - 10000	10

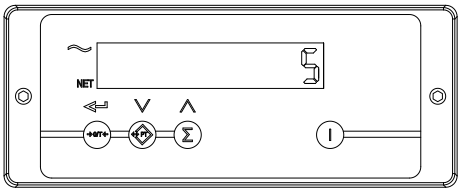
5



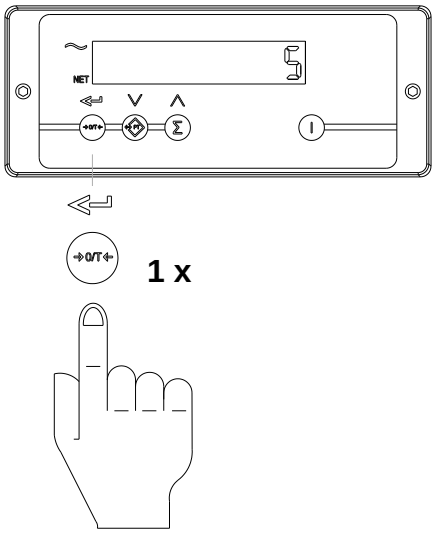
1 x

EXAMPLE #2:
If the truck capacity is 5000, change the value for P_02 into 5

6



7



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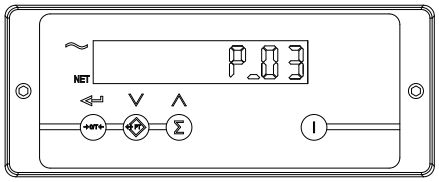

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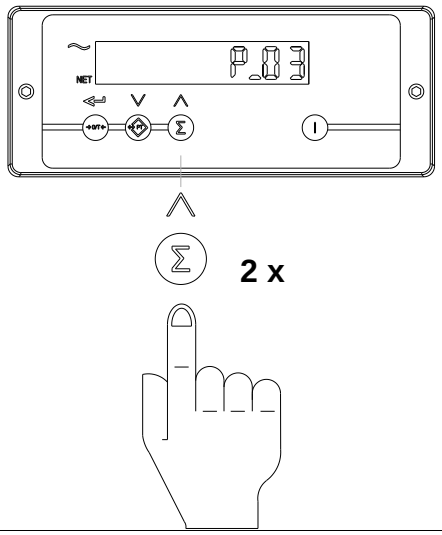

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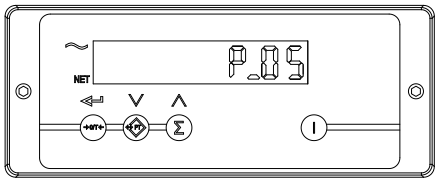
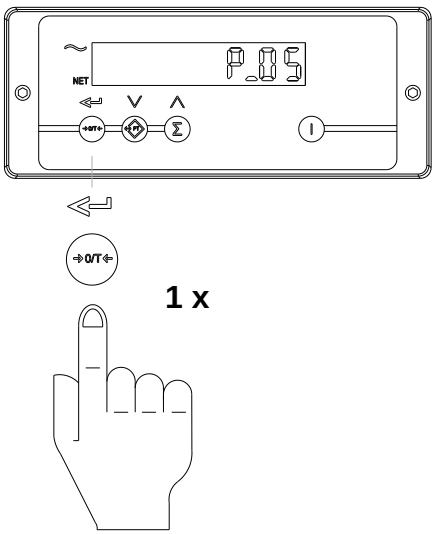


P_05 is the
Weighing capacity system

11



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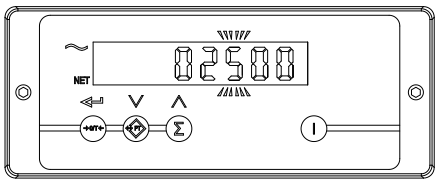

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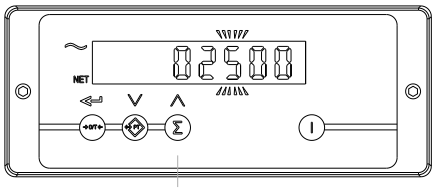
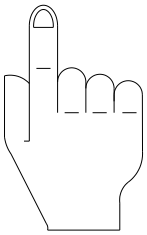
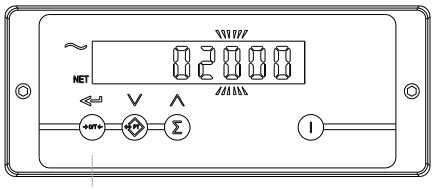


5 x

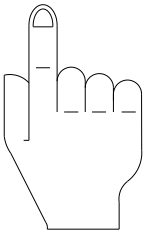


EXAMPLE #2:
If the truck capacity is 5000, change the value for P_05 into 5000

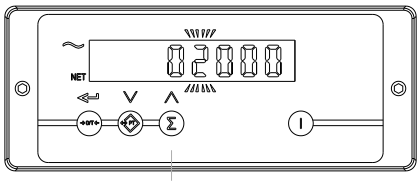
14



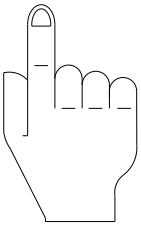
1 x



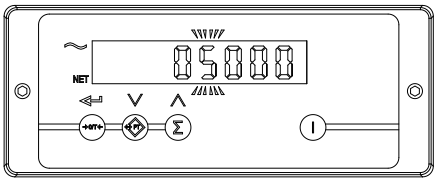
15



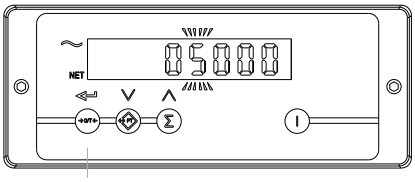
3 x



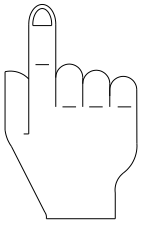
16



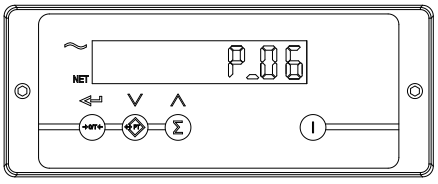
17



2 x

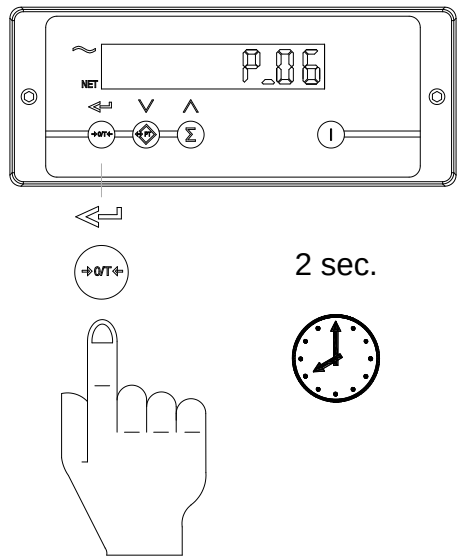


18

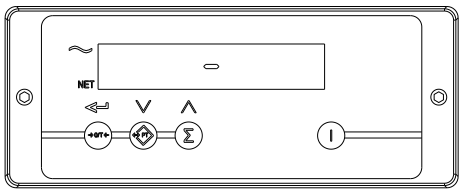


8.3 Leaving the parameter menu and saving changes

1



2



8.4 Default parameter settings

Parameter	Function	Settings	Default	Printer option
02	Graduation step	1/2/5/10/20/50/100	2	2
05	Weighing capacity system (full scale)	00000 - 99999 units	2500	2500
07	Printing units	1 = kg 2 = lb 3 = ton		0
08	Auto shut off time	1 - 99 min (0 = always on)	30	30
09	Number of wires per loadcell	4 = 4 wires 6 = 6 wires (approved)	4	4
11	Function	0 = BASIC 1 = 10 x Resolution 2 = ADC COUNTS	0	0
20	Baudrate comport	1200/2400/4800/9600/19200/38400	9600	9600
21	Databits comport	7 or 8	8	8
22	Parity comport	E = even - = none 0 = odd	-	-
23	Stopbits comport	1 or 2	2	2
25	Dataprotocol comport	0 = standard (remote) 1 = standard with printer	0	1
26	Number of linefeeds comport	0 - 7	6	6
27	LF on/off (PC protocol)	0 = only send CR 1 = send CR and LF		1
40	Levelswitch	0 = not used 1 = normally closed 2 = normally open	0	0
53	Measurement interval for weighing	0 = 1.0 sec 1 = 1.5 sec 2 = 2.0 sec 3 = 2.5 sec	1	1
54	Delay interval for weighing	0 = 1.5 sec 1 = 2.0 sec 2 = 2.5 sec 3 = 3.0 sec	2	2
55	Threshold value	20/50/100/200/500/1000/2000/5000	200	200
90	Reset to default parameter settings (calibration will be deleted!)			
92	Low battery auto switch off (2 minutes after “lo-ba” message)	0 = not active 1 = active	1	1
99	Software version indicator			

9. Attachments

9.1 Connecting the system wires and printer wires

If the RCS *PLUS* is equipped with a printer, connect the wires of the power supply and the printer with indicator board as shown in the wiring drawing below.